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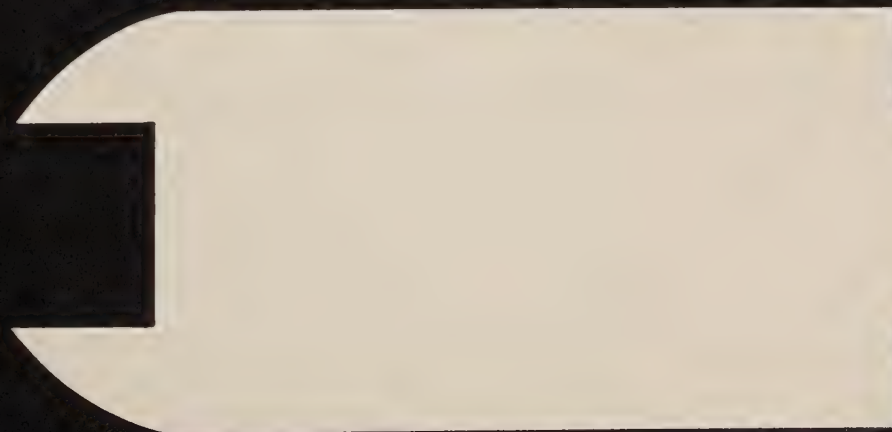
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What's Left of Our Cropland "Frontier"?

From the Administrator

Release this summer of results of the SCS Potential Cropland Study attracted widespread interest, not only from farmers, but also from land developers, commodity specialists, and all manner of groups concerned with land and water use.

What made news was our estimate of 111 million acres of land not now in crops that could be switched to cropland if needed. This is a considerably lower figure than previous USDA estimates, which had gone as high as 266 million acres of available cropland.

But SCS stands by its findings. To make our study, we started fresh, with SCS field people inspecting 41,000 sites in 506 counties. The sites were selected at random, using acceptable statistical techniques. They were located in 50 states, Puerto Rico, and the Virgin Islands. USDA's Economic Research Service helped us plan the study.

We identified three different acreages of potential cropland that could be switched to crops with varying degrees of difficulty and expense.

First, 24 million acres of "prime farmland" could be converted simply by beginning tillage. They have soils which require little or no protection from erosion and, with normal rainfall, should produce high yields.

Second, we identified 54 million acres of "high potential" land that would require some soil and water management to prevent erosion and sedimentation or to dispose of unwanted water.

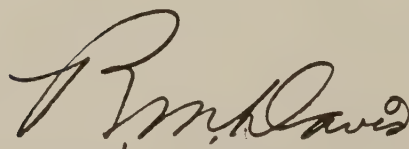
Finally, there are another 33 million acres with "medium potential" for conversion to crops. These acres pose more serious erosion hazards and water disposal problems and would cost more to convert. Nevertheless, soil conservationists see no reason why, with application of current technology, these acres could not be used for crops if the need arises.

SCS questions whether acreages beyond this 111-million-acre total could be brought into cropland safely.

Our field people also determined that some 400 million acres are planted in crops this year, including hay for cutting. This means that nearly four-fifths of the total cropland available in this country is already in crops; plant that last 20 percent and our cropland "frontier" is closed. An expanding U.S. population, coupled with growing demand for agricultural commodities abroad, makes our potential cropland figures seem very small indeed.

Our survey shows that urban development is already swallowing farmland at the rate of about 2 million acres a year, and too much of that land is either prime or has high potential for growing crops.

Certainly it is in the best interest of all Americans to preserve our better croplands for agricultural purposes, and not to allow them to be paved over for airports, housing developments, shopping centers, and highways.



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Earl L. Butz
Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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Surface Mine Reclamation in the Mountain State

by Frank W. Glover, Jr.

If you can't reclaim it, don't mine it.

That is the law today in West Virginia, where coal has been surface mined for more than half of this nation's 200 years.

The state made its conservation regulations catch up to expanding mining capabilities by passing the Surface Mining and Reclamation Act of 1971.

The act has a clearcut objective: to permit efficient surface mining of coal while keeping off-site damages to a minimum.

This means controlling runoff with sediment ponds and other measures, reducing slope length, and seeding and mulching as soon as possible after mining.

Mine operators prepare detailed plans for mining, blasting, drainage, and sediment control before mining begins; they also prepare plans for seeding, fertilizing, and mulching.

Such preplanning is strongly recommended by the Soil Conservation Service (SCS). During this stage, SCS district conservationists offer mine operators valuable technical assistance, based on knowledge of soils, water, and plants.

At this preplanning stage, subsurface material with excessive acid-producing potential is identified. Provisions are made so that, after mining, soils that will support plant growth are replaced on the surface.

SCS plant materials centers have played a major role in reclamation by developing plant varieties that will grow on acid mine sites. These include 'Chemung' crownvetch (*Coronilla varia*), 'Tioga' deertongue



Top photo: In West Virginia, grasses and legumes are required to stabilize soil immediately after surface mining. Weeping lovegrass was used here. Below: A sediment basin is installed before mining begins. West Virginia requires sediment control at mining sites to reduce offsite damage.

grass (*Panicum clandestinum*). 'Arnot' bristly locust (*Robinia hispida*), another SCS-developed shrub, beautifies the landscape while it conserves the soil.

The science and art of mine reclamation advanced by several large steps from the 1950's to the 1970's in West Virginia. Mine operators, soil conservation districts (SCD), and various federal and state agencies experimented with plants to control erosion and sedimentation.

Interagency teams evaluate many of these plantings each year.

Of the woody species, black locust trees (*Robinia pseudoacacia*) planted by hand have had the highest survival rate and probably do the best job of protecting an area. After black locust trees die at 10 to 12 years (due mostly to insect damage) the surface is protected from erosion by grasses, weeds, hardwood seedlings, and accumulated organic matter.

The shrub, autumnolive (*Elaeagnus umbellata*) has grown well and is a valuable species for wildlife. Pines are slower growing and provide little protection against erosion during the first 6 to 8 years after planting.

Of the grasses and legumes, Kentucky 31 fescue (*Festuca arundinacea*) has done well consistently. Redtop (*Agrostis alba*) and weeping lovegrass (*Eragrostis curvula*) provide early ground cover. Sericea lespedeza (*Lespedeza cuneata*) is probably the best of the legumes. Birdsfoot trefoil (*Lotus corniculatus*) has done well on many sites, and alfalfa (*Medicago sativa*) has grown well on a few. Plantings of crown-vetch (*Coronilla varia*) and flatpea (*Lathyrus sylvestris*) look promising. They appear to live longer than either birdsfoot or alfalfa.

The 1971 law requires consideration during reclamation of intended future land use. This often is grass-



"The SCS-SCD partnership in West Virginia remains flexible . . . We want to assist the coal mine operators and the West Virginia Department of Natural Resources in any way possible. Properly reclaimed surface mines benefit everyone."

land agriculture, the primary farming activity in West Virginia. SCS currently recommends tall fescue or orchardgrass with birdsfoot trefoil, alfalfa, or white clover for hay and pasture on surface-mined lands.

Woody species such as black locust, European black alder (*Alnus glutinosa*), autumnolive, shrub lespedeza (*Lespedeza bicolor*), white pine (*Pinus strobus*), and Virginia pine (*Pinus virginiana*) are still planted on many sites. Sometimes either recreation or timber production is the intended future land use. Last year, 850 apple trees were planted on surface-mined lands in Logan County by the Buffalo Creek Coal Company for fruit production.

Over the last 20 years, soil conservation districts have played a role in the reclamation of surface-mined lands in the state. Districts began this work in 1955 by providing work crews, along with technical assist-

ance from SCS, for reclamation. In 1958, a state law was passed which made mine operators responsible for establishing vegetation on their surface-mined land. But they were absolved of further responsibility if they turned the reclamation over to local soil conservation districts.

From 1958 to 1971, districts played a major role in surface mine reclamation. Many mine operators contracted with conservation districts to carry out the required reclamation.

After the 1971 regulations went into effect, mine operators could no longer be relieved of long-range responsibility for reclamation; thus, West Virginia's soil conservation districts were not directly as heavily involved in mine reclamation as before.

Now, however, more mine operators are turning to conservation districts for seeding and planting jobs. Some operators who have their own

employees reclaiming their mines seek technical assistance from SCS through the local districts.

"The SCS-SCD partnership in West Virginia remains flexible," said SCS State Conservationist Craig M. Right. "We want to assist the coal mine operators and the West Virginia Department of Natural Resources (DNR) in any way possible. Properly reclaimed surface mines benefit everyone."

SCS and the districts also are involved through "special reclamation" projects. The 1963 reclamation law requires mine operators to pay to the state \$30 per acre of coal mined by surface removal. This created a fund, still being built upon, for reclamation of "orphan strip mines," old mines never reclaimed because of either inadequate laws or enforcement in past years.

The DNR has contracted with districts for reshaping and revegetating many of these old, bare sites. SCS has participated in the planning. At times special efforts are made to experiment with future land uses, such as by planting shrubs for food and cover and creating small ponds for wildlife habitat.

Some special reclamation has been concentrated to clean up badly

During mining, the length of slopes can be shortened with diversions to break the flow of water and provide erosion and sediment control. This diversion is near Beckley.



polluted streams to make them habitable for fish again—such as Dents Run at Morgantown and Elk Creek at Clarksburg.

One of the major sources of sediment—uncontrolled erosion from haulageways—is now being controlled. Specifications require all roads to be drained into some type of sediment trap. Many haulageways include rock-riprap ditches with metal, perforated standpipes on drain culverts. Standpipes help prevent sediment from filling the culverts.

Grading is also helping control erosion. The 1971 law limits the high-

wall left after mining to a maximum height of 30 feet. DNR inspectors may require filling back to the original grade, eliminating the highwall altogether. At the same time, rebuilt slopes are being made more stable. In some places, surface mining is creating areas of level land by removing hill tops.

Careful grading for drainage to an established watercourse includes the construction of diversions and outlets.

One of the basic changes in reclamation over the years has been in revegetation.

In 1939, the state legislature passed a law requiring mining permits and seeding after mining. However, there were no requirements to regrade; no standards for judging satisfactory stands of vegetation; no guide for planting; and no regularly scheduled inspections.

The 1958 law required scheduled inspections and in 1967, a new Surface Mining Act set rigid standards for controlling erosion. The act emphasized grasses and legumes as the first step in effective reclamation—a basic change from the trees and shrubs previously preferred or required.

One illustration of why this change occurred comes from Quentin Bennett, SCS district conservationist at Clarksburg. He recalls that in the mid-1950's, he worked on the first mine site planted by a West Virginia conservation district. The plan called for planting 1,000 trees and shrubs per acre. These plantings prospered, but the basic ground cover—still healthy today—was a variety of deertongue grass which came in as a volunteer.

A grass or legume cover is now required in West Virginia on all sloping mined lands in addition to any trees planted.

The tools are available—both for controlling erosion during and after mining and for shaping the land for reclamation. Many coal companies are now cooperating to use these tools to make the future look better for all of West Virginia.

Mr. Glover is SCS state resource conservationist, Morgantown, West Virginia.



Great Plains Hit by Most Extensive Wind Damage in 20 Years

More than 6 million acres of land were damaged by wind in the Great Plains during the 1975-76 erosion season, the most extensive damage since the drought years of the mid-1950's.

Soil Conservation Service field reports from 352 counties in the 10-state area showed 6.2 million acres damaged from November 1975 to May 1976, compared to 3.8 million acres damaged during the same period a year ago. More than 90 percent of the damage was to cropland.

States reflecting the highest percentage of damage increase were Kansas, with 907,288 acres damaged

compared to 81,676 last year; Oklahoma, with 619,867 acres damaged compared to 63,465; and Nebraska, with 348,343 acres damaged compared to 49,760.

Texas reported the most land damaged, nearly 1.6 million acres, but that figure is less than the 2 million acres damaged in Texas a year ago. New Mexico was the only other state to report a decrease in wind erosion damage.

SCS considers land damaged if enough soil has been removed or deposited to subject the land to further erosion hazard, to materially lower yields, or to impair its capacity to produce.

Crops or cover were destroyed on more than 2 million acres of land not damaged. Of this total, 93 percent occurred in the southern Great Plains states.

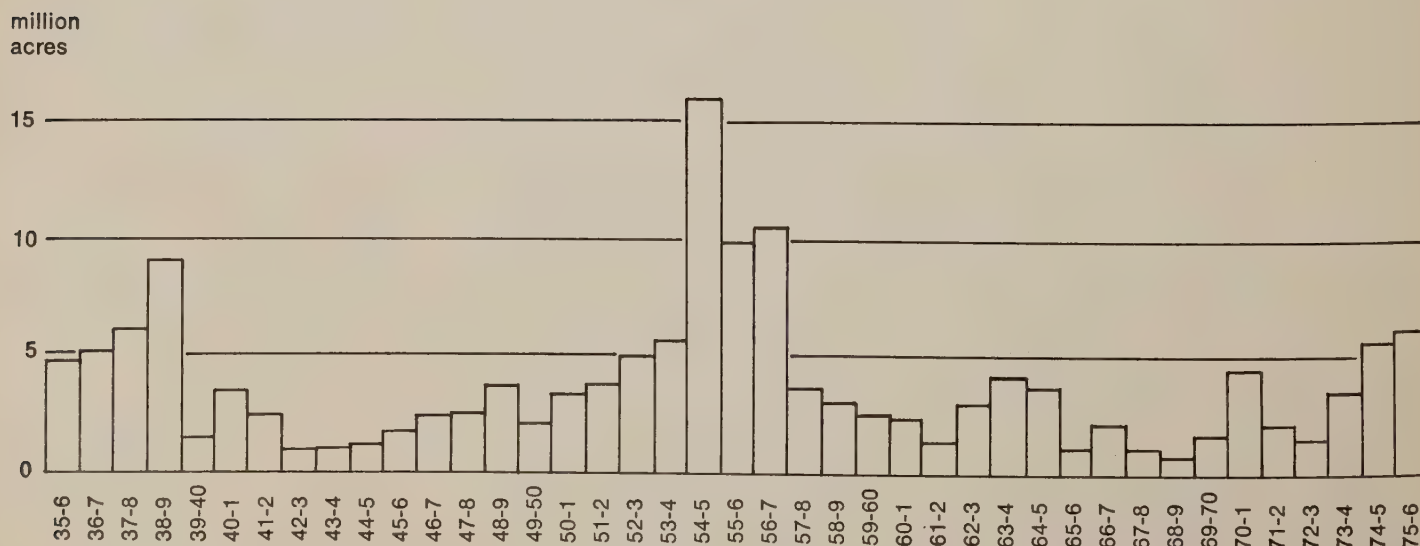
Emergency tillage to prevent land damage was done on 2.4 million acres, mostly in the southern Great Plains states.

Contributing to the increased wind erosion this year were prolonged drought, inadequate crop residue cover or cover crops, overgrazing, and excessive tillage.

SCS has kept statistics on Great Plains wind erosion damage since 1935, except for a 10-year period beginning in 1943 when figures were compiled by the Great Plains Agricultural Council. Damage is highest November through May, when high winds are most frequent, there is less protective cover on the soil surface, and there is usually less precipitation.

Acres of Land Damaged Annually in Great Plains

Seasons 1935-36 to 1975-76



Windbreak in Action

In the rural community of Hebron on South Carolina's coastal plain, 55 farmers banded together in 1967 to stop disastrous soil blowing on their once fertile land. With the help of the Marlboro County Conservation District, they planted some 40,000 pine seedlings to protect their fields of cotton and soybeans.

Now, nearly 10 years later, farmers can see the benefits of their windbreaks. Both fields pictured are in Hebron community. Both were plowed just several hours before the pictures were taken. In top photo, furrows protected by a windbreak are still sharp. In the unprotected field in photo below, however, soil has already blown from the ridge into the bottom of the furrows.

The protected soil is staying in place, organic matter is starting to build up, and the soil is regaining its fertility.





Now tiled and covered, the New North Platte Ditch lies beneath a chain of mini-parks in the town of Torrington, Wyoming.

by Jerry V. Hattan
and Jerry D. Gladson

The Beautiful Coverup

The Grassroots Gals' Garden Club has unearthed and then covered a town problem . . . and made it into an award-winning environmental project.

Club members coordinated efforts to cover an open irrigation ditch in the small town of Torrington in southeast Wyoming and to beautify and utilize the new land area.

They worked with the town council, Soil Conservation Service, Agricultural Stabilization and Conservation Service (ASCS), the Wyoming Recreation Commission—and the voters. A bond issue was passed by an overwhelming majority to share the cost of developing parks on the new land area created by covering the ditch.

The New North Platte Ditch had caused no environmental problems or hazards in the late 1800's when it was established.

But by the 1970's, it was causing several serious problems. It ran through a 13-block area of homes and presented a safety hazard to children. It also bred mosquitos.

An estimated 15 percent of the flow was lost to seepage and evaporation during the peak irrigation period, causing a water shortage problem for farm crops.

To solve all of these problems, the Grassroots Gals initiated a project they called "the Beautiful Coverup."

They helped convince the Torrington Town Council to make the land area into a chain of miniparks after the ditch was tiled and covered.

ASCS agreed to cost sharing with the farmers for the pipeline because of the conservation of irrigation water that would result.

The Wyoming Recreation Commission provided financial aid for park development through its Land and Water Conservation Fund.

The Soil Conservation Service did a need and feasibility study for the proposed project and designed an elliptical reinforced concrete

pipe to convey the 26 cubic feet per second flow through the town.

Landowners whose backyards bordered the once weed-covered ditch made many home and landscaping improvements on their own.

The Grassroots Gals are using their \$4,000 prize money—for first place in the 1973-1975 Environmental Improvement Program sponsored by the National Council of State Garden Clubs, Inc., and by Sears, Roebuck and Company—to begin their second environmental improvement project, "Downtown Beautification."

Mr. Hattan is SCS civil engineering technician, Torrington, Wyoming. Mr. Gladson is SCS district conservationist, Torrington, Wyoming.

Dam the Park

by Frank Lucas

Two years ago this month, the annual flooding in Upper Darby Township near Philadelphia, Pennsylvania, was worse than usual—7 inches of rain in 3 hours caused more than \$1 million in damages.

Supervisors of the township considered full flood control but found it out of the question because of economic and physical limits: With the high population density of the township—nearly 100,000 people in less than 8 square miles—large flood prevention structures would cost too much; and because the stream runs through a conduit under part of a town, diking would not help.

Therefore township officials, with SCS guidance, decided to build a floodwater retention dam in a



township park—a turnaround from the more typical practice of developing a park around a dam.

“The dam won’t do much when a big flood comes along, but we hope to eliminate some of the annual nuisance floods,” said Lawrence Tennity, the township construction engineer who designed the gabion-type dam. “The water that goes through the pipes in the dam will

safely pass through the conduit under the township of Upper Darby.”

SCS in Media assisted with the development of erosion and sediment control plans for the dam, which was completed last year.

Mr. Lucas is SCS district conservationist, Media, Pennsylvania.

“Granting” a Little Seed Money

Recording cassettes . . . 1,000 pounds of gypsum . . . fire brick for an outdoor kiln.

These were just a few of the items in the Pontotoc County Conservation District budget when it offered \$30 to \$50 “mini-grants” to teachers this year for projects dealing with conservation and the environment.

“The money for curriculum projects serves as an incentive,” explained Dan A. Sebert, education specialist

for the conservation district in Oklahoma. “It usually is used to offset costs of supplies used in innovative programs.”

The Oklahoma Conservation Commission also participated in the experimental grant program.

Eight grants were made this spring, two for original curriculum programs and four for classroom projects.

A university instructor received a grant for an art project in which pottery was made from natural materials. Students used a soils map to locate soil high in clay content, used for making pottery in a student-built kiln. They gained skills in pottery making, soil identification, map reading, masonry, and engineering.

Another grant went to two high school teachers who worked with 240 students on slide-tape presentations about water, soil, air, and

noise. The programs are now a permanent teaching aid and will be used for public information.

Most of the grants for class projects were used to improve outdoor classrooms. A special education class cleaned and planted on school grounds and photographed the stages of improvement. A vocational class helped transform a dump into an outdoor classroom. Another class built a weather station to enrich a study on the effect of weather on worldwide food production.

Mini-grant recipients kept records of their projects, documented with photographs. From the reports, the district education committee will evaluate the program, assisted by teachers, professors, and a representative from the Oklahoma Department of Education.

Five Point Program in the Palouse

Would you exchange nearly a ton of rich topsoil for a bushel of wheat? Farmers in many parts of the Pacific Northwest's Palouse region make this expensive bargain every year.

The Latah Soil and Water Conservation District (SWCD), however, has hit on a solution that combines five conservation practices to cut soil losses by 75 to 90 percent on more than 26,000 acres of western Idaho wheatland.

The practices are minimum tillage, contour seeding, dividing steep

slopes (a modification of contour stripcropping), critical area seeding, and elimination of summer fallow.

District supervisors developed the "Five Point Program" following the 1973 Idaho Governor's Conference on Erosion and Sediment Control. Today, 30 of the county's nearly 900 farmers have qualified as "Five Point Farm-



ers," entitling them to priority technical help through the SWCD.

The Palouse is an area of loess soils, as deep as 12 feet, in Washington, Oregon, and Idaho. The rich soils can produce more than 100 bushels of wheat per acre without irrigation, but are highly erodible.

Each bushel represents almost a ton of topsoil lost through erosion by farmers who use typical agricultural practices, according to Tom Carlson, SCS district conservationist for Latah County. "A single big rain can wash

"A single big rain can wash away more than 150 tons of soil an acre . . ."

away more than 150 tons of soil an acre that ends up blocking roads and filling downstream reservoirs."

To become a "Five Point Farmer," an applicant must develop a conservation plan, with Soil Conservation Service assistance, that includes target dates for completing the five conservation practices. Applicants then attend an Interagency Review Board meeting to discuss the plan with SWCD supervisors, the county extension agent, the county weed supervisor, and representatives of the Agricultural Stabilization and Conservation Service and SCS.

The selected farms serve as models, according to Carlson. "For each Five Point plan on the ground, dozens of neighbors have seen the results and have adopted at least some of the practices for their land."

The Five Point Program also has attracted statewide attention. The Idaho Department of Health and Welfare has proposed preparing Five Point plans for all farms in the Cow

Creek watershed of Latah County. The department's proposal includes a monitoring system that would measure changes in the creek's sediment load as conservation practices are carried out.

As the program grows, Latah SWCD supervisors are gaining confidence that it will help bring an end to the severe problem that has plagued Palouse farmers for years.



It doesn't take long to figure out which is under Idaho's Five Point Program. At left: Clean cultivation preceded this winter wheat and is leaving its mark. At right: Plenty of evidence—and soil—marks a Five Point Farm.



Campaign Draws Interest in Conservation Tillage

More Iowa farmers are trying minimum tillage, thanks to a campaign undertaken last year by the Hancock Soil Conservation District (SCD).

The campaign began with a field day to demonstrate the soil-saving technique and ended with a prize drawing for campaign participants.

"District commissioners set three objectives during campaign planning," according to SCD Chairman Cletus Hejlik. "We wanted to find out the extent and types of minimum tillage being used around here, to encourage farmers to give the technique a try, and to make more people aware of conservation district services."

More than 100 farmers participated

in the SCD-sponsored field day, held during April 1975, when various minimum tillage equipment and methods were demonstrated.

The technique was explained in the SCD newsletter, which goes to the district's 1,400 farmers, and was promoted on radio and television and through local newspapers. Posters also were used to urge farmers to sign up for the campaign and a chance at more than \$1,000 in prizes—from tractor radios to airplane rides—donated by agricultural equipment dealers.

During the year, more than 230 registered in the campaign. Results showed more than 150,000 acres in corn and beans, nearly half the county's cropland, being farmed with some form of reduced tillage.

"To qualify, participants had to be using minimum tillage equipment to its best advantage," Hejlik said. "We found some people didn't realize they were causing as much damage as they would have by plowing—by disking three or four times and covering the residue."

The district's campaign success provided directors with "courage to try the approach again," according to Hejlik. Called "Save Our Soil and Wildlife," the current effort stresses tree and shrub plantings for windbreaks, field corners, and other critical areas.

"Campaigns like these put our soil conservation district in the public eye," said Hejlik. "Once people know what we can do, we can begin to help with their individual problems."

Evergreen Forest North Dakota Style

by Elmer R. Umland

A tree planting project started 7 years ago has brought 600,000 more evergreens, equal to a dozen per resident, to grazing lands in Ward County, North Dakota.

The plantings of ponderosa pine and some Rocky Mountain juniper, eastern redcedar, and blue spruce protect the land and provide a haven for wildlife in the Souris River Basin near Minot.

The project was the idea of the late Gisli Johannson, Jr., who served as SCS district conservationist at Minot.

The conservation district usually orders trees from the North Dakota School of Forestry and keeps its

tree planter in nearly constant use each spring.

Some landowners receive cost sharing help from the Agricultural Stabilization and Conservation Service (ASCS). ASCS calls the practice "Odd Area Plantings of Trees and Shrubs for Beautification of Countryside and Wildlife Benefits."

The practice includes plantings that will provide wind and water erosion control and are protected from fire and destructive grazing.

"The program has been an overwhelming success since the first year it was offered," said Rueben Rue, county executive director, ASCS, in Minot.

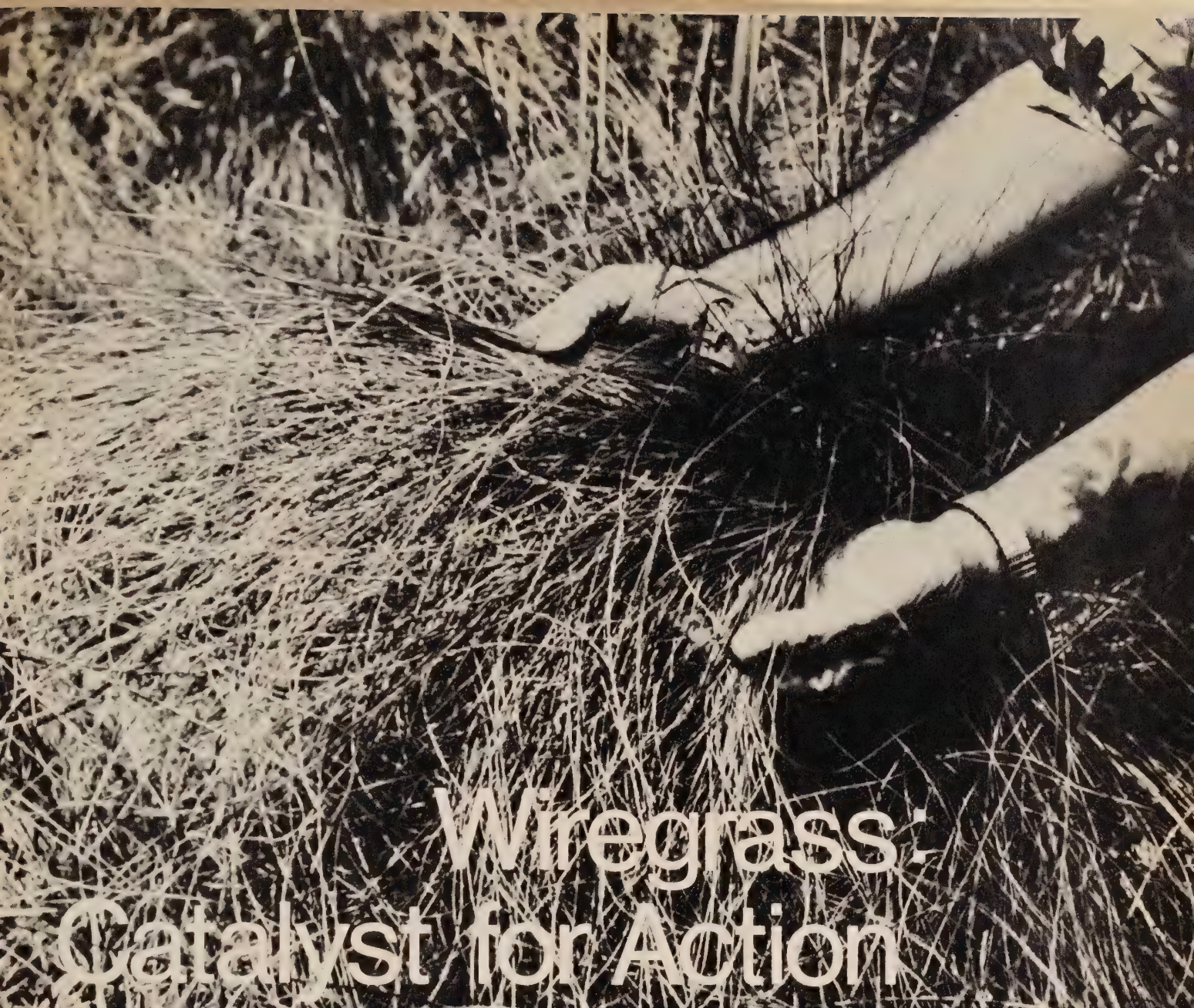
An SCS analysis of the evergreen plantings indicates:

- the evergreens did best with adequate scalping of the sod and when placed at about 6-foot intervals;
- ponderosa pine had the highest survival rate, about 80 percent, and the fastest annual growth, about 9 inches on all sites;

- the best growth and survival were on north, northwest, and northeast exposures.

Bob Reinharts, on whose farm the first trees were planted in the spring of 1968, notes that 90 percent of the ponderosa pine planted are living and "providing 6-foot tall monuments to Johannson."

Mr. Umland is SCS forester in Bismarck, North Dakota.



Wiregrass: Catalyst for Action

by Hubert W. Kelley

In southeastern Alabama, the Wiregrass RC&D makes things happen.

Since it began operations in 1967, this lively resource conservation and development project has helped people in its 9-county, 4-million-acre area to improve their lives and livelihoods in dozens of different ways.

Wiregrass RC&D gets its name from a tough, wiry plant that used to cover the region's wooded coastal plains. Described by one historian as "the poorest grazing a cow ever set hoof in," wiregrass today is getting hard to find. Few mourn its passing.

But the RC&D that bears its name is taking on more life every year. Leadership is coming from a 27-member RC&D council, composed of

three members from each county. Of the three, one is a county commissioner, one is a member of the local soil and water conservation district, and one is selected "at large" from the ranks of local farmers, bankers, and businessmen. As might be expected in this heavily agricultural area, most members are farmers or part-time farmers—or business people who rely on farm customers.

"Accomplishment . . . We can point to tangible progress in stabilizing roadbanks, building boat landings, healing gullies, and promoting conservation generally."

Farmer Milton J. McKeller, former Wiregrass RC&D Council chairman, attended four council meetings plus four of a nine-man executive board a year. "We put in the hours because we believed in what we were doing," he said.



Specific RC&D measures are the work of six resource committees: information and education; agriculture and land use; recreation and tourism; fish and wildlife; forestry; and community services and facilities.

"Council members are all busy people," says former council chairman Milton J. McKeller, who raises cattle and timber in Pike County. "But attendance at council meetings is really astounding. All these people come faithfully without compensation. And attendance is even better today than it was at first."

What keeps them coming?

"Accomplishment," says Marion Sanders, another former council head and a corn-and-peanut farmer in Coffee County. "We can point to tangible progress in stabilizing roadbanks, building boat landings,

healing gullies, and promoting conservation generally.

"And we've done something else. The RC&D for the first time has got county governments and soil conservation districts talking together and working together. For the first time these people have seen our difficulties as area-wide problems. Before the RC&D, you couldn't interest anybody in a problem outside his own county." Sanders is a conservation district supervisor.

Stopping big gullies from getting worse has been a major undertaking of the RC&D. People unfamiliar with the erosive soils in parts of the Southeast may find it hard to visualize one of these red clay "canyons" or the rapidity with which it can develop. A single hard rain can start a gully, and in just a few years the chasm may be as deep as



Not a very big gully by Wiregrass standards, but it had to be stopped before it ate into nearby highway. Pipe is outlet for principal spillway, which runs beneath embankment in rear. (See photo on page 17.)

40 feet, a hazard to human and animal life as well as property.

Gullies in the Wiregrass country were threatening cropland, highways, even the parking lot behind Coffee County's new Farm Center Complex. Through efforts of the RC&D, the government's share of cost sharing for grade stabilization structures to stop the biggest gullies was raised from 50 to 80 percent. Several young men employed under Title X of the Job Opportunities Program worked to heal the gullies—in Coffee County under county direction; in Covington, under the district.

"Most of the Covington County Title X employees are working on roadbank stabilization—and the RC&D helped spark the program," according to County Commissioner Hiram Pitts, who is also secretary of the RC&D Council. "If I had to select the most important single contribution of the RC&D in these parts, it would have to be erosion and sediment control . . . sloping and planting these raw, red roadbanks, healing gullies, and getting more

farmers to use soil conservation practices."

Pitts recalls that many acres once called "wasteland" are now in productive pasture and woodland.

"These RC&D sediment control programs are doing more to clear up stream pollution than anything else I can think of," the commissioner says. "There is already a noticeable improvement in the appearance of our streams."

But he admits that the program still has a long way to go. Pointing to a wide shallow stream, blocked by red clay bars and surrounded by dead trees, Pitts says it was once deep and flowing and usable for fishing and boating.

"No fish there now," he says, "all because of sediment. I'd guess that about half our sediment washes away from unprotected roadbanks."

Wiregrass RC&D also gets involved in helping rural people get community water and sewage systems.

"Farmers Home Administration (FmHA) makes the loans for these systems," said Flournoy Whitman,

Coffee County commissioner and current chairman of the RC&D Council. "But Bill Ray of the FmHA office here is the first to admit that the RC&D is playing a major role in educating people on the need for water systems, doing groundwork, and getting them to come out for the first organizing meeting." As a result, rural water towers are becoming a familiar sight in southeastern Alabama today.

The RC&D also is helping industry develop and expand, creating more jobs in the area. According to one Covington County manufacturer, it was RC&D project engineer Richard M. Keith and local district conservationist W. F. "Pat" Patterson who helped him make a "problem" plant site usable.

John Vick, general manager of Dixon Plywood in Andalusia, says his firm owned a 150-acre tract, located near a good highway and a railroad, that met most of its requirements for a new plant site.

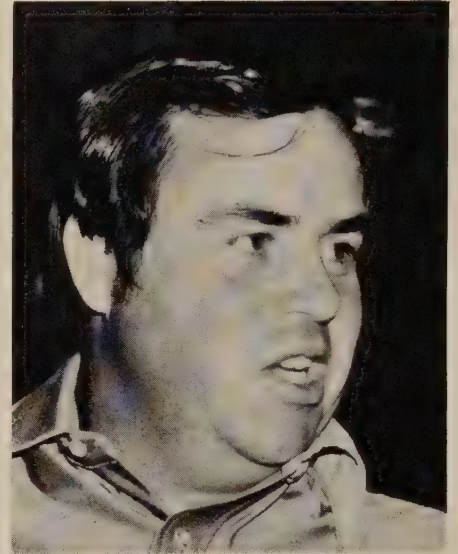
"But when we started construction," Vick recalls, "we discovered



On other side of embankment is inlet to carry storm water through grade control structure. Culverts at rear of structure protect highway. Federal, county, and private funds went into these Alabama "gully-stoppers."



Left: Roadbanks still erode despite concrete flumes built to carry rainwater from field. Below: Dynamic John Vick of Dixon Plywood insists that RC&D helped him save "problem" building site.



Once deep and free-flowing river is now shallow, choked by sediment. During heavy rains, it overflows its banks, flooding nearby areas, killing trees, and depositing its load of sediment.

"No fish there now," he says, "all because of sediment. I'd guess that about half our sediment washes away from unprotected roadbanks."

we were in water-bearing sands. Springs started sprouting everywhere."

Keith and Patterson worked with Vick's architect in helping design a 500-foot French drain that runs through the plywood plant site, with six laterals at intervals to keep the water moving underground.

"It worked," says Manager Vick, "and enabled us to build our new plant where we wanted it." Dixon Plywood today employs 200 people; boasts a \$3 million annual payroll; and provides work for at least 100 more people who cut and transport the "peeler" logs to the factory.

Through example, demonstration, and technical aid, the RC&D and the district also are having an impact on agriculture in the area. Farmers come from miles around to inspect the system of parallel terraces with

tile drain outlets in the peanut fields owned by Council member Sanders. They were the first in his county, and they helped dry out low spots in the sandy fields quickly, even after torrential rains.

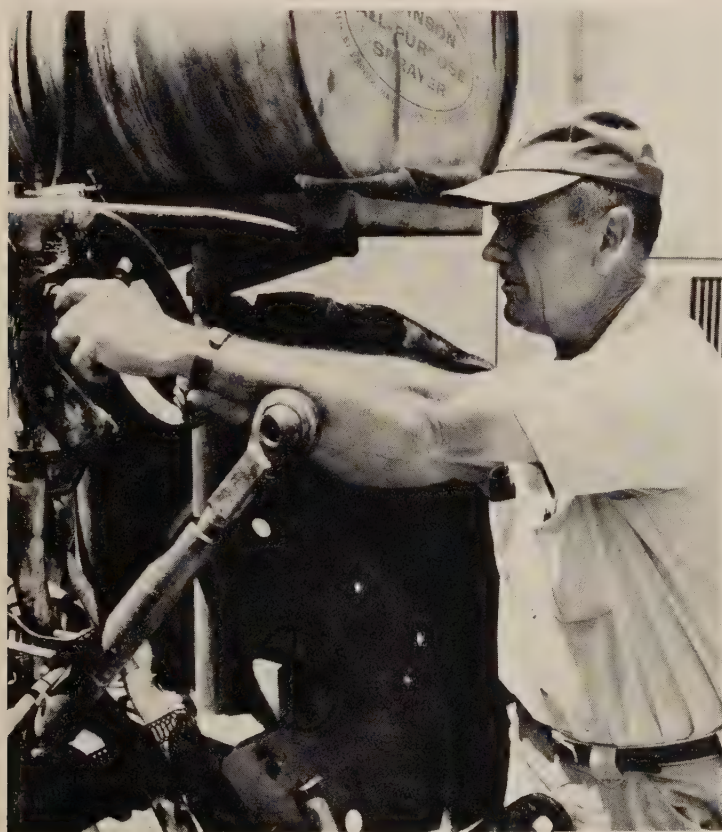
"I don't think we can afford to recommend any practices we don't try on our own farms first," Sanders remarks.

And in nearby Coffee County, RC&D leaders take visitors to the big general farm of Martin Moates, a conservation district supervisor and the first local grower to use no-till techniques in growing corn.

Some scoffed at first, like Moates' neighbor who said, "I never knew a man too lazy to plow before." But as the weeks went by, and the no-till corn looked better and better, the wisecracks died away and farmers started taking notes.

Farther south, in Geneva County, the RC&D and others are helping farmers make the difficult and expensive change from cotton farming to vegetable farming. Vast fields of tomatoes, cucumbers, peppers, and melons now produce more income per acre than cotton farmers could hope for, with the produce moving through a new farmer-owned packing house. RC&D technical people helped with new irrigation systems and reservoirs, and with soils interpretations for the new crops. They answered questions like: How much water should we put on the land? How fast will the soil take it? How much slope before the soil washes? Which acres are best for tomatoes?

Woodlands also get attention, since 55 percent of the RC&D's land area is forest. Barry Lawrence, assigned by the State Forestry Commission to the RC&D project area, concentrates on getting landowners to grow more trees under various cost-sharing programs and on improving present stands by thinning and pruning.



RC&D Council member Marion Sanders is veteran of three wars: World War II, Korea, and never-ending battle against soil erosion.



Job Opportunities Program employees build temporary flume to protect new county Farm Center Complex from menacing gully.

"I never knew a man too lazy to plow before." But as the weeks went by, and the no-till corn looked better and better, the wisecracks died away and farmers started taking notes.



RC&D project coordinator Cameron Lyle inspects crop damage in inadequately protected cornfield after more than 6 inches of rain in 12 hours. Sandy coastal plain soils are highly erosive.

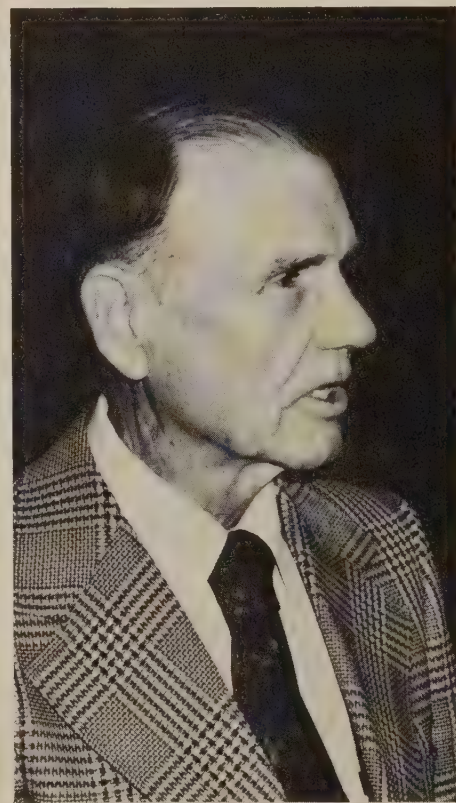
"Big problems are lack of money and lack of interest," says Lawrence, "but we're doing something about both in Wiregrass. The RC&D is helping, because we have two foresters in the area instead of one and more advantageous cost sharing for the landowner."

A driving force behind all the action in Wiregrass is RC&D project coordinator Cameron Lyle, whose office is in Ozark. Lyle thinks, eats, and sleeps Wiregrass.

"When Cameron is showing you what's happened down here," says a friend, "he hates to see the sun go down."

"We work with anybody and everybody," reports Lyle. "In Henry County, we worked with a mayor, a school superintendent, the Kiwanis Club, and a factory manager to stop flooding in local schools and erosion on the playgrounds."

"To get more recreation, we work with mayors, the Corps of Engineers, and other agencies, businessmen, and university and junior college people, as well as with county and



RC&D Council chairman Flourney Whitman is proud of role in getting more community water systems.

conservation district representatives. And before long, we hope to have a new 780-acre lake in our own small watershed project.

"It's never easy to get everybody working together, but when the dust clears away, we usually find that the job has got done somehow."

Lyle admits that it's hard to explain an RC&D to a stranger.

"It's not because we do so little, but because we do so much, so many different things," he says. "Whenever there's a problem of land use in these nine counties, the RC&D has a way of getting involved."

Lyle believes that an RC&D is many things to many people. "It's a conservation program; it's a financier," he says. "Or it's planning help or technical help. It's an expeditor or a 'facilitator.' But I think of it most as a catalyst—as that mysterious ingredient that somehow starts things happening and is still there when you are finished to take on a new job."

Mr. Kelley is Director, Information Division, SCS, Washington, D.C.

William Covington (left), superintendent of schools in Henry County, joins SCS engineer Randy Martin in examining drainage system to keep water out of low-lying school building. Successful project was RC&D measure.



In Andalusia, RC&D helped new junior college develop tennis courts, ball diamond, driving range and golf course open to the community. Left to right: SCS district conservationist W. F. "Pat" Patterson; RC&D council secretary Hiram Pitts; J. B. "Jim" Rodgers, soil conservation district chairman; and Seth Hammitt, on the college staff.

SCS Launches Study of Windbreaks in the Great Plains



Left: As part of the ground check in pilot study, SCS forester Jim Carr measures length of a windbreak in Buffalo County, Nebraska. Above: Windbreak measured in pilot study is showing effects of use by cattle, such as for shade on this 98-degree day.

The Soil Conservation Service has begun a pilot study of windbreaks and their removal in 10 Great Plains counties. Results will be published by December 31.

The study will determine the number and types of farm windbreaks now on the land, trends in windbreak removal and planting, and reasons for windbreak removals over the last 5 years.

It follows the General Accounting Office (GAO) report last year calling for action to discourage removal of windbreaks in the Great Plains. The GAO report noted the need for accurate, up-to-date information on windbreaks.

The study was launched June 10 in Buffalo County, Nebraska. The other nine counties to be studied

are Dickey, North Dakota; Faulk and Hughes, South Dakota; Antelope, Cedar, and Sherman, Nebraska; Trego and Ness, Kansas; and Blaine, Oklahoma.

The counties were selected because each has a large number of windbreaks and each has aerial maps available for the study's comparison periods, 1970-71 and 1974-75. Iowa State University's statistical laboratory in Ames helped identify the sample areas.

SCS will compare aerial photographs to determine windbreak plantings and removals during the

last 5 years. SCS field personnel will establish reasons for the removals, such as clearing for center pivot irrigation systems, disease or age of trees, and reorganization of fields for other crops or purposes.

The pilot study will be followed by a comprehensive study covering 346 counties in the 10 Great Plains states.

Staging a Meeting

Do your meetings get started late? Get off the track? Adjourn with problems unsolved?

Iowa's annual short course for soil conservation district commissioners addressed just these problems—and more—in a mock meeting last January at Iowa State University.

The mock commissioners included members of the State Soil Conservation Committee, Iowa Association of Soil Conservation District Commissioners, and various agency leaders. They illustrated the "don'ts" of conducting a meeting.

Representatives from soil conservation districts, the Soil Conservation Service, and Cooperative Extension Service presented the "do's" of conducting a well organized and productive commissioners' meeting.

Nearly 350 people attended the 2-day course, including 200 commissioners representing 83 districts.

Topics during the short course included perspectives on minimum tillage, water quality as it relates to soil management, and progress and attitudes toward soil conservation in Iowa.

The course is sponsored by the Cooperative Extension Service, assisted by the Iowa Association of Soil Conservation District Commissioners, the Iowa Department of Soil Conservation, and the Soil Conservation Service.

Meetings:

August

- 1-4 National Association of Conservation Districts 1976 Northeast Regional Meeting, New Carrollton, Md.
- 1-4 Soil Conservation Society of America, Minneapolis, Minn.
- 10-12 Symposium on Inland Waterways for Navigation, Flood Control, and Water Diversions, Fort Collins, Colo.
- 15-18 American Agricultural Economics Association, University Park, Pa.
- 15-18 National Farm and Power Equipment Dealers Association, St. Louis, Mo.
- 15-19 National Association County Agricultural Agents, Richmond, Va.

September

- 8-10 Chesapeake Section, American Water Works Association, Ocean City, Md.
- 9-13 American Horticultural Society Congress, Philadelphia, Pa.
- 12-17 State Conservationists' Annual Meeting, Kansas City, Mo.
- 19-24 American Fisheries Society, Dearborn, Mich.
- 20-24 International Association of Game, Fish, and Conservation Commissioners, Dearborn, Mich.
- 26-30 Association of Conservation Engineers, Wrightsville Beach, N.C.
- 27-
Oct. 1 American Society of Civil Engineers Annual Convention, Philadelphia, Pa.
- 29-
Oct. 2 National Conference of Editorial Writers, Hilton Head, S.C.

October

- 2-6 American Bankers Association, Washington, D.C.
- 3-8 Water Pollution Control Federation, Minneapolis, Minn.
- 12-15 Annual Meeting of the Hardwood Plywood Manufacturers Association, Toronto, Canada
- 14-17 National Association of Biology Teachers, Inc., Denver, Colo.
- 17-20 American Forestry Association, Disney World, Fla.
- 17-21 National Recreation and Park Association, Boston, Mass.
- 18-20 American Plywood Association Industry Meeting, Biloxi, Miss.
- 23-27 National Environmental Sanitation and Maintenance Educational Conference and Exposition, Boston, Mass.



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To and From All the Public

From the Administrator

You don't have to tell those of us who deal with natural resource questions every day that the public is more interested than ever in our activities.

It's an encouraging sign, and one that we—as conservationists—need to encourage even more.

As the limits of America's natural resources become more apparent each day, public involvement—from individuals and organizations—is crucial to resource allocation.

It's not enough to post a notice, hold a hearing, send out a questionnaire. When we are in a project activity, we need—from the start—to seek out all the various concerned publics and bring them into the planning process.

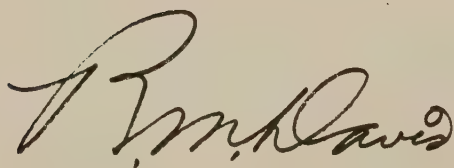
We need to be as concerned about full public participation as we are about inventorying resources. It's important that we lay out what we know to all the public—and not just have it available to “those involved” or to “those who ask.” As professional conservationists, we're in a position to recognize “resource tradeoffs,” point out difficulties, and—if need be—resist poorly conceived approaches.

We are part of the public trust. We have a responsibility to assure that valuable resources are protected. At the same time, we have a responsibility to give a voice to everyone who has an interest in these resources. If we and the sponsoring groups go our own way—instead of seeking out all concerned audiences, providing information, and welcoming ideas—we may face costly delays, litigation, and dead ends.

The Soil Conservation Service came into being as an agency because of public involvement—a public that demanded something be done about the damage caused by duststorms and gaping gullies in the 1930's. Together with conservation districts, watershed project sponsors, and resource conservation and development councils, we've long sought widespread participation in conservation programs. Without it, SCS would not exist, for nearly all the programs we administer require the voluntary cooperation of private landowners and state, county, and municipal governments.

Yet, because natural resources are finite—and because some genuine interests or concerns in their use and management are not as readily seen or heard as others—an even broader base of public participation is needed in natural resource allocation. That's what we're going after. It's not going to be easy. But it's a challenge we're going to meet.

The wise use of America's natural resources cannot be guaranteed by any agency. It can be assured through what we encourage: full public involvement in determining how resources will be used.

A handwritten signature in black ink, appearing to read "R. M. Davis". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Soil Conservation

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Earl L. Butz
Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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Cover:

Sediment is—by volume—the greatest pollutant of the nation's water. Although more than 3 billion tons of sediment wash into streams each year, the problem is by no means irreversible. For stories on sediment control, see pages 7 and 21.

Accent on Action

How do you get things moving in a rural county? Residents of Granville County, North Carolina, are fast becoming experts in answering that question, for that's what they've been doing the last 6 years through their rural development panel.

by Anne Zack

You won't hear people complain that "it's not my job" in Granville County, North Carolina.

That's because anything that will improve the rural economy and standard of living is the job of the Granville County Rural Development Panel.

Forty public agencies and private organizations pool their resources through the panel, tackling everything from distributing rat bait to running a housing "fair."

"It's a good vehicle to get things done because almost all the government agencies and important business firms in the county are represented on the panel," said William J. Harrell, the Soil Con-

servation Service (SCS) district conservationist who served on the panel from its formation in 1970 until last spring, when he moved to Smithfield, North Carolina.

The 13 original panel members selected four areas of emphasis: protecting the environment; obtaining better housing; strengthening the economy; and improving public services.

They set both long- and short-range goals. The panel reviews its progress on the goals at monthly meetings. Accomplishments range from sanitary landfills to housing for the disadvantaged and elderly.

In the area of environmental quality, for instance, panel members

Trees form a windbreak and screen around Granville's new landfills, where a layer of soil covers each layer of trash.



The Granville Panel received the superior service award from the U.S. Department of Agriculture this year—one of the highest awards in the Department. The panel was recognized for its “imaginative and aggressive leadership in helping the citizens of Granville County protect their environment, obtain better housing, strengthen their economy, and improve the delivery of public services.”

loaded 1,150 pounds of rat bait in their cars last year and delivered it to farmers and homeowners plagued by an increasing rat population. The year before, they launched Operation Big Crush. In that project, they rented a plane to pinpoint abandoned cars and—with help from more than 100 local leaders from 51 organizations—rounded up 9,000 junked cars and trucks. These were hauled to a plant 100 miles west in Kernersville for crushing, shredding, and recycling.

Thanks to the panel, the county now operates two sanitary landfills. Working through the Granville Soil and Water Conservation District (SWCD), SCS tested the soils, recommended sites to the Board of County Commissioners, and helped prepare engineering plans.

“Before the landfills opened about 2 years ago, people burned their trash in dumps. Old refrigerators, bedsprings, and anything else that wouldn’t burn piled up in fields and streams,” said George L. Taylor, current SCS district conservationist in Granville County.

SCS directed the cleanup, grading and seeding of the old dumps. Most of the land is now in grass and sericea lespedza, planted to control erosion and prepare the soil for eventual use as pasture.

The panel also sponsors semi-annual land-use seminars for public officials and citizens. The goal: to stimulate planning in this county within 50 miles of both Raleigh and Durham. Planning and zoning, sedi-

In this development, a gully (top) was shaped into a drainageway (bottom) and the area was seeded and mulched to comply with Granville’s subdivision ordinance. (Bottom photo courtesy of The Oxford Daily Ledger)

mentation, and the campaign for a progressive soil survey are among the topics covered. Professionals from SCS, Extension Service, state agencies, North Carolina State University, and other counties contribute ideas.

Under its public services program, the panel published two guides to services offered by tax-supported agencies in the county and a speakers guide. Some 35 agencies statewide have speakers available for local meetings.

To improve rural fire protection,

the panel defined the area to be served by each of the county’s 11 fire departments, most of which are volunteer companies. The panel also started a central switchboard for emergencies. By dialing 117, residents can reach fire departments, ambulance service, the rescue squad, or police and sheriff’s departments.

For its economic development program the panel focused on forestry. Led by USDA agencies and industry foresters, the panel organized an Association of Forest Landowners. It also revitalized the



Good management practices, especially site preparation and thinning, could double or even triple the average annual income of \$11 per acre in the county.

Tree Farm Program begun in the early 1960's. To be recognized as a tree farm by the State Forestry Association, woodland must be managed according to a forestry plan developed with industry foresters, SCS, Extension Service, or other approved agencies.

Good management practices, especially site preparation and thinning, could double or even triple the average annual income of \$11 per acre in the county, according to industry foresters on the panel. Small forest tracts cover 65 percent of Granville's 210,000 acres.

The forestry project got underway during the energy crisis in 1974 and eased two problems at once. At the suggestion of SCS technician B. J. Loyd, the panel offered firewood referral service. People willing to cut their own firewood were put in touch

with landowners whose trees were marked for thinning.

"To get things moving" on a critical housing shortage, in 1971 and 1972, the panel held housing fairs in Oxford, the county seat. At that time, 37 percent of the county's housing was substandard. A modular home and mobile homes for families of limited resources were main attractions.

More than 50 firms displayed the latest materials and ideas in home construction and furnishing. An SCS exhibit stressed the importance of considering soils when building.

"The interest took us by surprise," said SCSer Harrell. "More than 15,000 people came—nearly double the population of Oxford."

The panel also helped organize the Oxford-Granville Housing Authority, which has provided 182 housing

units for the elderly and disadvantaged in three communities. More than 850 new homes have been built, 375 mobile homes purchased, and 200 homes renovated through efforts of the panel and housing authority.

At the request of the Board of County Commissioners, SCS worked with Farmers Home Administration (FmHA) and Extension Service on an ordinance regulating subdivisions. The ordinance requires that soils be mapped and their limitations for urban uses be determined. It also requires the board of supervisors of the Granville SWCD to review subdivision plans.

"We plan some projects, like Operation Big Crash and the housing fairs, to rally the people and get things moving," Taylor said. "Some others, like the ordinance, have a more permanent effect even though they don't attract as much publicity."

"To get things moving" is a byword of the panel. Along with rallying projects, the panel sponsors tours. Some spotlight "forestry show windows"—examples of good woodland management; others feature farms and livestock operations. One was to see the plant that processed cars during Operation Big Crash.

Back home in Oxford, Billy L. Price, FmHA county supervisor, summed up the feelings behind the panel. "My job is to make and service loans," he said, "but through the efforts of the panel, we can do things that help the whole community—things that otherwise might not get done."

Ms. Zack is a staff writer, SCS, Information Division, Washington, D.C.



Bill Harrell (left) and George Taylor check trees marked for selective harvesting. The rural development panel designated this tree farm as a "forestry showcase" and features this spot as an example of good woodland management on its forestry tours.



Erosion: Today's Soil, Tomorrow's Silt

by Vernon Reinert
and William P. Oemichen

The specter of erosion threatens 4 out of 10 acres of Minnesota cropland. Here's how federal and state agencies plan to correct this problem.

We cannot stop sedimentation completely, but we can reduce it by reducing erosion to limits that are not harmful to our society.



On a wintry day, snirt (snow and dirt) forms intricate pattern on snowdrift in southwestern Minnesota near Lakefield.

The life-support system for any body of water is its watershed. From this high land, trickles and dribbles and flows of water replenish a stream, river, or lake. How ironic it is, then, when a watershed kills the body of water it supports!

Eroded soil—from croplands, forests, highways, and stream and riverbanks—is the culprit. Once it gets into a river or lake, it becomes sediment, the major pollutant of Minnesota waters.

"Many people are surprised to hear that sediment is such a severe water

pollutant," says Harry M. Major, state conservationist for the Soil Conservation Service (SCS) in Minnesota. "The pollution is so great because of the sheer volume of land that drains into a body of water. Hundreds of thousands of tons of sediment flow into lakes and streams every year. We cannot stop sedimentation completely, but we can reduce it by reducing erosion to limits that are not harmful to our society."

A 1971 inventory of conservation needs in Minnesota conducted by the SCS indicated that 9 million acres, 39

percent of Minnesota's cropland, is subject to erosion by either wind or water.

Each year, soil losses in Minnesota total about 30 million tons, the equivalent loss of 1 inch of topsoil on 670 average-size Minnesota farms.

But much more than soil is lost when erosion occurs. In 1975, the U.S. Senate Committee on Agriculture and Forestry estimated that, nationwide, some \$1.2 billion worth of nutrients are lost each year. The figure is based on the 1974 market value of the fertilizer it takes to replace lost nutrients. (Loss of nutrients also wastes energy because manufacturing fertilizer requires large quantities of energy.)

Charles Clark of rural Lake City had an erosion problem on the farm he bought 3 years ago. His erosion was exceptionally severe, but it illustrated how vulnerable the land was when it was not protected from the elements.

The sloping land had been planted with corn and beans for 10 years before Clark bought it. The rills in the fields were 6 inches deep, 3 inches wide, and 250 feet long. In one cornfield, they scored every row.

"That soil had to go somewhere," Clark recalls.

Much of it washed away as sediment. In fact, a small pond on the farm was completely silted in. After one rainstorm, Clark had to use a bulldozer to clean silt out of a ditch near his driveway.

Streambanks and lakeshores are a significant source of sedimentation. In fact, in southern Minnesota where slopes are relatively short, streambank erosion contributes more sediment to the water than does erosion from the uplands.

In addition to agricultural land, roadsides, urban and industrial developments, and urban watersheds can become other major sources of sedimentation.

To see the nation's waters clean, Congress has required controls to prevent eroded soil—no matter what the source—from becoming a water pollutant. Under the Water Pollution Control Act Amendments of 1972, erosion and other forms of runoff are considered "nonpoint" sources of

pollution. Each state must develop plans and programs for their control by 1983.

Federal funds from the Environmental Protection Agency (EPA) are available to states to help finance planning. SWCDs, SCS, and the Minnesota Soil and Water Conservation Board (MSWCB) have agreed to work with the Minnesota Pollution Control Agency (MPCA) in this planning effort.

The law requires a water-quality planning process which will identify nonpoint sources of pollution and the extent to which they are harming water quality.

Open sewer pipes or malfunctioning septic tanks are "point" sources of pollution. But pollutants from nonpoint sources drain off many acres that make up the watershed, streambank, or shoreline. Contributing to nonpoint sources are tillage, pasturing techniques, fertilizers, pesticides, herbicides, manure, feedlot management techniques, and home construction.

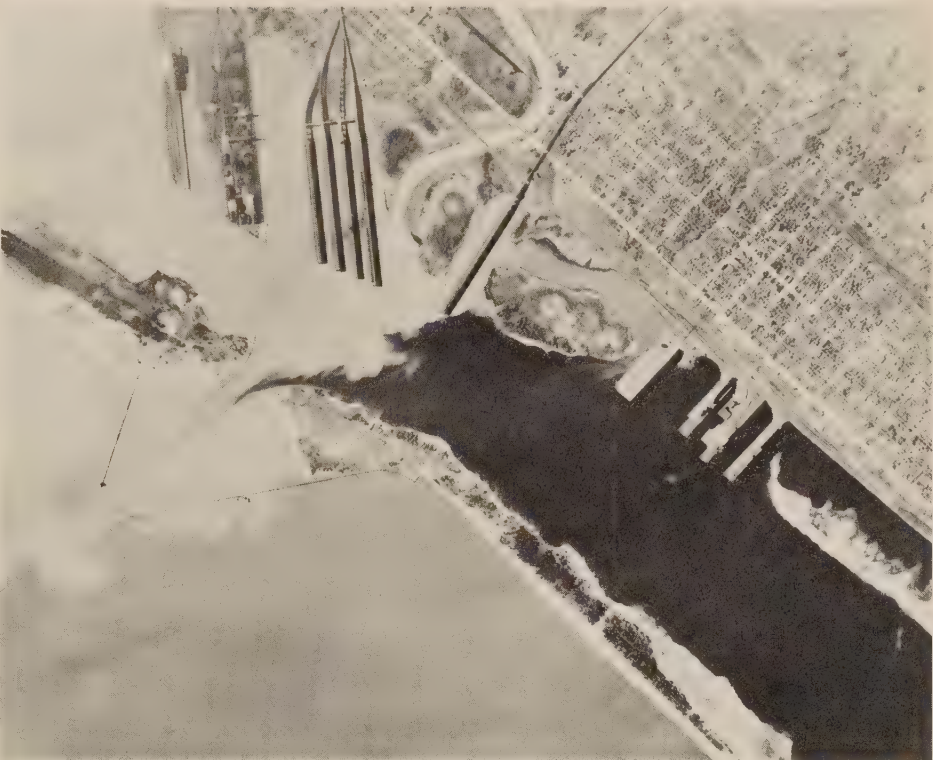
Once pollution sources are identified, the next step required by the Water Quality Act is to decide on what EPA calls the "best management techniques" to minimize pollution from nonpoint sources.

Defining and controlling nonpoint pollution sources are a new and unfamiliar task for most local and state agencies. On the other hand, SWCDs have been working with erosion problems for nearly 40 years.

Minnesota's 92 SWCDs are legal entities of state government. They were created to help landowners solve their soil and water problems. The districts receive technical and financial support from various federal, state, and local agencies. These agencies include the Agricultural Stabilization and Conservation Service and SCS of the U.S. Department of Agriculture; the Agricultural Extension Service of the University of Minnesota; the state Soil and Water Conservation Board; the State Department of Natural Resources; and county boards of commissioners.

Working through their local SWCDs, some 63,000 Minnesota landowners have applied conservation practices for erosion control of their

Each year, soil losses in Minnesota total about 30 million tons, the equivalent loss of 1 inch of topsoil on 670 average-size Minnesota farms.



Top: Severe roadside and streambank erosion on red clay soils is evident throughout Nemadji River watershed in Carlton County west of Duluth, Minnesota. Bottom: Aerial view of Nemadji River shows dark cloud of sediment flowing into Lake Superior at Superior-Duluth harbor. The Carlton County Soil and Water Conservation District is attempting to find a solution to this vexing problem.

Nearly half the state's tillable cropland is worked by landowners who cooperate with SWCD erosion-control policies.



Hundreds of thousands of tons of sediment flow into Minnesota lakes and streams each year. Erosion may occur along streambanks, along shorelands under development, along sheer edges of drainage ditches, or wherever straight-line planting of crops allows erosion of soil into water areas. In southern Minnesota, where slopes are relatively short, streambank erosion contributes more sediment than does erosion from the uplands.

land. Nearly half the state's tillable cropland is worked by landowners who cooperate with SWCD erosion-control policies.

SWCDs are not well known, except by the landowners who work with them. Most people in soil and water conservation programs believe that SWCDs must play an integral part in the sedimentation aspects of non-point pollution control planning. They believe that today's conservation practices—evolved through research and trial-and-error over 40 years—are effective pollution control measures, but they need to be strengthened and better financed for the state to fulfill many of its water quality responsibilities.

The Minnesota Association of Soil and Water Conservation Districts, an organization of the state's 92 districts, stated that districts should have authority "to plan, implement, and regulate the control on nonpoint pollution" in Minnesota.

According to association president LeRoy Swenson, "The districts are prepared to work with state-designated agencies to accumulate non-point pollution data, to prepare pollution control plans, and to participate in carrying out future necessary regulations."

MSWCB chairman Clarence Ettenvold says that "the Board can facilitate district involvement in the program by entering into contracts with the Minnesota Pollution Control Agency to secure the funds districts would need to participate in planning, implementation, and regulation." The board presently administers the state portion of the funding of conservation district activities.

Conservation district efforts to control roadside erosion in Douglas County show what districts can do.

A survey of the county's roadsides pinpointed about 450 sites where soil eroded off roadsides into lakes, streams and fields. Seventy-seven sites were classified as severe, and improvements were designed. Most were seeding projects, but structures to divert water and control flow were planned for some severely eroded sites.

Costs for these improvements were shared among the county board,

Some combination of crop residue management and minimum tillage is needed for erosion control on about half the state's cropland.

landowners, and the WesMin Resource Conservation and Development area. Such cost sharing is available only when an SWCD is a legal sponsor of a project.

Julian Loken, chairman of the Douglas County SWCD, believes the project "illustrated that the conservation district is interested in erosion problems from such areas as roadsides as well as farm-related causes, and can work effectively with a variety of groups to solve overall resource conservation problems."

"Traditional conservation practices such as contouring, stripcropping, and grass waterways are very effective in controlling runoff and erosion from sloping land," states the SCS's Harry Major. "And some newer practices, such as minimum tillage and feedlot pollution-control systems, are proving to have direct water quality benefits. The immediate concern is that landowners need more cost sharing and technical assistance so they can accelerate application of these important erosion-control and water-quality practices."

Some combination of crop residue management and minimum tillage is needed for erosion control on about half the state's cropland, according to Major. Only about 10 percent of that potential has been reached. Three years ago, however, minimum tillage was being practiced on only 1 percent of cropland that needed it.

About 30,000 agricultural waste management systems are still needed, but Minnesota leads the nation in attempts to keep feedlot runoff out of lakes and streams (about one-third of these systems in the U.S. are in Minnesota).

Minnesota now has more than 1,000 agricultural waste management systems installed. Peter Gove, MPCA executive director, said that his agency's approval of the landmark 1,000th permit was a milestone in the state's effort to control animal waste pollution.

Nonpoint pollution control efforts in Minnesota will include a feedlot inventory to determine the extent to which livestock operations near lakes and streams are a pollution hazard. The inventory will be conducted by SWCDs through grant money from the Minnesota Soil and Water Conservation Board. The Board will carry out nonpoint pollution control planning in Minnesota, with funding from the Pollution Control Agency, which is the agency designated to coordinate nonpoint pollution control planning in the rural areas of Minnesota.

The Pollution Control Agency is now putting together the work plan for nonpoint in Minnesota. When that is complete this fall, funding will be available and nonpoint pollution control planning will begin. The price tag could range from \$1 billion to \$2 billion for bringing into allowable limits nonpoint pollution from streambanks, roadsides, feedlots, farmland, and other sources. The goal for Minnesota: Unmatched water quality in lakes and streams that will continue to enhance Minnesota's unexcelled quality of life.

Mr. Reinert is executive secretary, Soil and Water Conservation Board, Minnesota Department of Natural Resources, St. Paul, Minnesota.

Mr. Oemichen is SCS assistant state conservationist, St. Paul, Minnesota.

The article appeared in the March-April 1976 issue of *The Minnesota Volunteer*, published by the Minnesota Department of Natural Resources, and is reprinted here with permission.

"Tagging" Funds For Education

by Crystal A. Williams

Personalized license plates are providing financing for environmental education programs in California. Income from the \$25 fee for personalized tags goes into the state's License Plate Environmental Protection Program, which has a 1976-77 proposed budget of \$4.5 million. Of this, \$400,000 is budgeted for environmental education.

Grants available for environmental education are for teacher education, curriculum and materials development, capital outlay, and summer intern programs.

Various agencies and institutions are eligible for the grants, including natural resource districts, school districts, cities, counties, and public colleges and universities with teacher education programs. State funds must be matched by local funds or materials and services.

The Evergreen Resource Conservation District and the San Jose Unified School District in Santa Clara matched funds last year to help the nonprofit Youth Science Institute acquire a state grant of \$4,922 for conservation education.

With the nearly \$10,000 total, the Institute is developing a learning package to teach the urban child the need for good conservation practices within urban areas. The package includes a slide presentation; a discussion guide; lesson plans; 225 hours of elementary classroom instruction; 75 hours of junior high classroom instruction; and 104 hours of teacher inservice conservation lessons.

The environmental education grants are awarded by the state superintendent of public instruction.

Ms. Williams is SCS public information officer, Davis, California.

by John George

Restoration in Endless Mountains

In northeastern Pennsylvania, RC&D has been involved in historical restoration—from a two-story log cabin built for Marie Antoinette to protection of Wyalusing Rocks overlooking the Susquehanna River to the creation of a state park around springs that once were a major source of salt for Indians

It's not hard to find things worth preserving in northeastern Pennsylvania.

Covered bridges, an old mill village, and a refuge built for a queen are among the restoration measures tackled by the Endless Mountains Resource Conservation and Development (RC&D) Council in Pennsylvania.

"RC&D usually looks to the future, but in this case, we have a great heritage, and RC&D can play a role in preserving that heritage," says Howard Miller, chairman of the RC&D area that includes five counties, 4,000 square miles, and 150,000 people.

The RC&D council consists of 10 people: five conservation district



directors and five county commissioners.

Miller, who also is chairman of the Wyoming County Conservation District, credits the success of the many historic restoration projects in the area to public participation.

Old Mill Village in Susquehanna County, for instance, is today a thriving operation run by local craftsmen and owned by the state.

"But this area looked like it would fold financially a few years ago when it was a private, nonprofit development," Miller said.

"Our RC&D coordinator at the time assisted local citizens in convincing the State Historical and Museum Commission to buy the property."

The restored village includes an old mill site, dating to the 1830's, a mill pond, and buildings where such crafts as harness making, needlepoint, and rugmaking are continued today. The original village was on a turnpike route and many settlers passed through on their way west.

"We had the same sort of involvement when Salt Springs went up for sale," Miller said.

"An RC&D council member and two carloads of local people, again supported by the former RC&D coordinator, went to the state capital to meet with local legislators.

"With an assist from the Nature Conservancy, Salt Springs is now a

450-acre state park, the first in Susquehanna County."

Historically, deposits at the springs were a major source of salt for Indians and for early settlers. Today, the park features the Springs, a glen, stream, waterfalls, and a stand of hemlock more than 600 years old.

One of the more unusual projects RC&D has been involved in is French Azilum, a community founded in 1793 by immigrants fleeing the French Revolution. Plans are underway to restore this Pennsylvania historic site. The abandoned village includes reproductions of several log homes. The goal is the reconstruction of the two-story log cabin built in hopes



An unusual RC&D activity is restoration of the French community of Azilum, founded in 1793 by immigrants fleeing the French Revolution . . . the goal is the reconstruction of a log cabin refuge for Marie Antoinette.

that Queen Marie Antoinette could escape to this community on the banks of the Susquehanna River.

RC&D has worked closely with many individuals and organizations in resource programs in the multicounty area, including township supervisors, borough councilmen, conservation and recreation groups, the Northern Tier Regional Planning and Development Commission, the League of Women Voters, and the Endless Mountains Association, which promotes tourism in the area.

Together, they've participated in:

—Restoration of three covered

bridges in Sullivan County. One was on a main state route and was restored by the state highway department; a second took a special bill in the state legislature; a third was restored with county revenue sharing funds.

—Restoration of a one-room schoolhouse, built in the 1860's. When money was not available to fix it up, the late Carlton Birchard, an RC&D councilman, organized a work crew; businessmen donated materials; and local people donated articles that had been used in the school. It is now open as a museum.

—Historical recognition and marking of the Milford-Owego Turnpike. Completed in 1822 at a cost of less than \$100 a mile, it was the first direct route from New York City to northern Pennsylvania and south-central New York.

—Relocation of two planned highways to preserve a sacred Indian burial ground and Wyalusing Rocks, which provide a scenic view of the Susquehanna River and Bradford County today and were Indian look-out points in yesteryear.

"These weren't just RC&D," Miller said. "There was a lot of local support. That's what RC&D is all about."

Mr. George is RC&D coordinator, SCS, Endless Mountains Resource Conservation and Development Area, Towanda, Pennsylvania.





Northeastern Pennsylvania shows the marks of historical activities of the Endless Mountains RC&D. Left: Two of the covered bridges being restored in Sullivan County. Top: Old Mill Village, owned by the Commonwealth of Pennsylvania and operated by local residents and craftsmen. On preceding pages historic Wyalusing Rocks, high above the Susquehanna River. In the path of highway construction they were doomed until citizen protests led to a change in the highway route.

Prairie Wildflowers on the Horizon

by Jeffrey K. Butcher

Once covering the prairies, native wildflowers are coming back, this time with the help of man.

On a cool Nebraska spring morning Omaha Indian Chief Blackbird led a buffalo hunting party along the Platte River.

As the party moved through the open prairies, native grasses shifted with the breeze, creating a smooth wavy pattern.

Recent rains had caused the grass to shed its brownish tint for green. A Great Plains tapestry was taking



It'll be a while before you can buy the seed, but these native wildflowers are well on their way into production to control soil erosion and to restore and beautify pastures, rangelands, and roadsides in the Midwest. Clockwise, from bottom: 'Eureka' thickspike gayfeather, 'Nekan' pitcher sage, and 'Kaneb' purple prairieclover.

"Midwest travelers and residents may soon see an abundance of wildflowers as magnificent as those described by the early American pioneers on their journeys west."

form with colorful native wildflowers—blues, yellows, purples, and whites—woven into a natural background of grasses.

Two thousand miles due east the white man was locked into the American Revolutionary War, which would, in time, have a profound influence on the environment of the Great Plains.

In a hundred years, the Omaha Indians' numbers would dwindle as homesteaders moved in. As they turned the sod, tilled the soil, killed the buffalo, and brought in longhorns, the Nebraskans also destroyed the various wildflowers that were endemic to the prairies.

It took another century before native wildflowers would be re-established by the descendants of those settlers.

Last January, the Midwest's first certified varieties of native wildflowers were released after 10 years of cooperative tests by the Soil Conservation Service (SCS), the Kansas and Nebraska State Agricultural Experiment Stations, and the Nebraska Department of Roads. The plants will not only provide erosion control on public and private lands, but also enhance community, roadside, and rangeland beauty.

These three domesticated wildflowers are 'Kaneb' purple prairie-clover, *Petalostemum purpureum*; 'Nekan' pitcher sage, *Salvia azurea* var. *grandiflora*; and 'Eureka' thick-spike gayfeather, *Liatris pycnostachya*. The names of 'Kaneb' and 'Nekan' were derived from the states where the selected accessions were developed, Kansas and Nebraska. 'Eureka' was named for Eureka, Kansas, where the thickspike gayfeather was collected that was eventually selected. Their combined blooming seasons span nearly 3½ months, from mid-June to late September.

The SCS Plant Materials Center at Manhattan, Kansas, will produce and

distribute foundation seed to selected seed growers this fall. If good growing conditions prevail, seed growers should have limited quantities available in the fall of 1978. The University of Nebraska Field Laboratory at Mead will maintain the breeder seed.

"We felt wildflowers could be important not only for their esthetic appeal, but also because some of the native legumes could help to revitalize the soil," said Peter N. Jensen, SCS state range conservationist in Lincoln, Nebraska.

"We felt we were missing something by not using wildflowers. Grass is beautiful in itself, but travelers going through the state might think it is blah."

Plant specialists ran into several obstacles, though.

"We had no guidance or experience on how to approach seed production, needed fertility, what kind of fertilizer could be used, and how much available moisture would be necessary," said Robert Lippert, SCS plant materials specialist in Manhattan. "We had to learn." Nearly 20 evaluation plots were established: on the Manhattan Plant Materials Center; at SCS field offices in Kansas, Nebraska, and South Dakota; at the University of Nebraska Field Laboratory at Mead; and along Nebraska highways.

From 1972 through 1974 the three varieties were monitored to establish seed yield per acre, germination, purity, and number of seed per pound. Several accessions were used. The varieties were also checked for height, width, number of flowers, length of flowering period, seed set, and disease resistance.

"For a plant to be considered for the program," said Dr. Sotero Salac, University of Nebraska horticulturist, "it must not be a noxious weed since it would be in public use areas; it must not be poisonous; and it should

be edible to livestock and wildlife.

"It also should have a good root system to prevent soil erosion, and it must associate or compete with other vegetation," Salac remarked.

'Kaneb,' a native legume, has the capability of fixing nitrogen into fertility-depleted areas and is good forage for animals. It grows best in Nebraska, Kansas, Oklahoma, New Mexico, Colorado, Wyoming, and portions of Iowa and Missouri.

'Nekan' is a bushy plant with blue flowers that resemble snapdragons. It helps strengthen prairie grazing lands and serves as feed for wildlife. It can be best established in Nebraska, Iowa, Kansas, Missouri, and Oklahoma.

A tall, spike-like lavender-flowered plant, 'Eureka' can add beauty to gardens, highway corridors, and lowland meadows. It thrives in Nebraska, Iowa, Kansas, Oklahoma, and Arkansas. It can survive with little or no additional water and fertilizer.

"Midwest travelers and residents may soon see an abundance of wildflowers as magnificent as those described by the early American pioneers on their journeys west," summed up SCS Administrator R. M. Davis earlier this year. "At the same time, the wildflowers, when mixed with native grasses, will provide superior, self-sustaining protection against soil erosion along highway roadbanks."

Mr. Butcher is SCS public information officer, Lincoln, Nebraska.

Pioneers in GPCP

by Russell Christianson

Nineteen years ago, the Sackmans of Streeter, North Dakota, were among the first in the nation to sign a contract under the Great Plains Conservation Program. A look at their farm today shows their continued "putting into practice" their belief in conservation.



"I believe wind and water erosion on this place is as near zero as it's possible to make it."

That comment comes from one of the first signers of a Great Plains Conservation Program (GPCP) contract, Berthold Sackman of Streeter, North Dakota. Sackman and his wife Shirley signed one of the three first GPCP contracts on December 19, 1957.

Administered by the Soil Conservation Service, the Great Plains Conservation Program is designed to solve problems in the Great Plains resulting from drought and cultivation of land not suited for sustained crop production.

The Sackmans entered into the GPCP contract soon after buying their 1,280-acre farm. They paid about \$16 an acre. The improvements they've made since have helped increase the value fivefold.

With technical assistance and cost sharing provided, they corrected poor grazing distribution on the farm. During their 3-year contract, they put in six stockwater ponds and 2 miles of crossfencing to rotate pastures and distribute grazing. They planted a 10-row farmstead windbreak to protect their home and livestock.

"We've never destroyed a single soil-saving project that we cost shared," Sackman says.

They decided to reseed the cropland shortly after they bought it—the soil survey showed most of the land was better suited to grassland agriculture.

"We didn't think it was intended for crop farming when we bought it," Sackman said. The previous owner had a mixed cash grain and livestock operation.

Deciding the land could carry a herd of 100 cows if provided some supplemental feed, they built the herd to this number by the time the newly seeded grass was ready for grazing.

Since then, they've added 600 more acres of hay and rangeland and built their beef herd to 170 cows, all purebred registered Sax Herefords. Sackman's annual bull sale attracts buyers from several states. Their original stock was mostly good grade

Hereford cows and purebred Hereford bulls.

Shirley Sackman, a part-time teacher in Streeter, comments that her husband knows every one of their 350 cows, calves, and bulls—and knows the number of the ear tag each carries.

"Sometimes in the warmer months, Bert will ask me to ride out and bring in such-and-such a number," she says. "I go out there and search all over the place. Bert can go out and spot the animal right away, as if its number was painted in big numerals on its side."

The Sackmans, cooperators with the Stutsman County Soil Conservation District, long ago lost their "status" as the only GPCP signers in the county.

To date, 150 farmers there have signed up with the program and are carrying out improvements on their land. They continue to honor "one of their own," however, as a pioneer in a conservation program.

Mr. Christianson is SCS district conservationist, Jamestown, North Dakota.

Conservation and Farm Broadcasters

North Dakota conservationists were on the air all over the Midwest in June following the Midwest regional meeting of the National Association of Farm Broadcasters in Fargo.

During the meeting, broadcasters from 10 Midwestern states taped interviews with members of the North Dakota Association of Soil Conservation Districts. The association sponsored a breakfast for the broadcasters at which members discussed soil and water conservation problems, activities, and opportunities in the state.

The broadcasters also spent a day on bus tours covering farming and conservation in Cass County. Guides were from the Soil Conservation Service, Extension Service, and Agricultural Stabilization and Conservation Service.

Mantle of Manure

by Shiraz Vira

Farmers in eastern Idaho are getting double duty from the application of liquid manure.

They've long used it for fertilizer, but in the last few years have discovered it—and spread it—as a means to control wind erosion.

"It absolutely stops wind erosion during the early spring, even on the sandiest of soil," says Nile Wilding, chairman of the Mud Lake Conservation District north of Idaho Falls.

The liquid manure—obtained free from nearby dairy farms and feedlot operations—forms a strong bond with the soil as it dries.

"When that cold, icy wind starts blowing at 35 miles an hour on newly leveled ground, it's the only thing that will hold the sand in place," comments Zeke Ward, a farmer in Treeton in Jefferson County.

The manure is used both on newly prepared fields, and on newly seeded ones. Grain and hay seedlings emerge easily through the mantle of manure unless an excessive application has been made. The manure prevents seeds from blowing away, conserves moisture, and raises the soil temperature resulting in earlier germination.

The only problem, comments area farmers, is finding enough to go around.

Mr. Vira is SCS soil conservationist, Rigby, Idaho.

Once the sun dries it out, liquid manure forms a strong bond with the soil and protects it from wind erosion. As long as not too much has been applied, grain and hay seedlings easily emerge. The manure protects them from blowing away, conserves moisture, and raises the soil temperature.



Banking on Rangeland

by Dain Root

Ever have to explain grazing systems, crossfencing, and range seeding to a lender as you apply for a loan for range improvements? Nebraskans are taking a short cut . . . with a short course.

Ranchers know that conservation practices pay, but seldom right away.

To spread that awareness, Nebraskans are organizing workshops on range management for bankers and other agricultural lenders.

In a day's time, they better acquaint lenders with conservation districts and conservation plans and practices such as proper use and grazing systems.

Lenders need to know—in arriving at repayment plans—that the range

improvement from crossfences, water developments, and grazing systems may be several years in coming.

Some lending institutions have "deferred interest" loans on which the rancher does not pay interest until the practice begins to yield a return.

Lenders also need to understand why biggest is not necessarily best. Traditionally, they have loaned money to ranchers by taking cattle as collateral. The more stock a rancher owned, the more money he could

borrow. These sessions show why too many cattle on rangeland is just as uneconomical as too few.

It is especially important to Nebraska's natural resources that lenders understand the value of good range management. Agricultural loans are a \$1 billion business in the state. Cash receipts from livestock sales last year totaled \$1.5 billion, and the number of cattle and calves totaled more than 6.5 million as of January 1.

Peter N. Jensen, SCS state range conservationist, is one of the leaders in the workshops, whose sponsors include SCS, Nebraska's natural resource districts, and the Society of Range Management.

"In providing the necessary capital, banking and lending agencies play a big role in resource development and operations," Jensen notes.

"Credit is one of the keys to the success or failure of ranch operations in using, developing, and protecting native pastures."

At a recent session in O'Neill, SCS district conservationist Bob Lowe participated in a morning session covering range conditions; plant physiology; range economics; USDA conservation cost-share programs; and range management and improvement practices such as seeding, proper grazing use, and planned grazing systems.

In the afternoon, the lenders visited a nearby ranch, gathering onsite information on such topics as plant identification, range condition evaluation, and planned grazing systems.

Nebraska ranchers are finding the workshops are giving lending institutions the background to make realistic loans based on an owner's ability to manage his grassland at a profit—a profit to the land, the rancher, and the lender.

Mr. Root is SCS area conservationist, Broken Bow, Nebraska.



Altoona Mountain Restored

by Samuel H. Geiger



Surface mining operations for coal left this land in northeastern Alabama barren and eroding. Stream channels were filling with sediment and fields, roads, and homes were being flooded.

When everyone from the coal company owner to the mayor pitched in, it didn't take long to control erosion caused by surface mining on Altoona Mountain.

You might say they stopped a mountain from moving.

Runoff from surface-mined Altoona Mountain in northeastern Alabama had been filling stream channels with sediment and causing flooding and silt damage to fields, roads, and homes below the mountain for years.

Then the mayor of Altoona, a county commissioner, the Soil Conservation Service district conservationist, and the owner of the coal company got together.

A plan was developed between the Etowah County Commissioner, the Etowah County Soil and Water Conservation District, and the coal company owner, who was a district cooperator.

Because reclamation of the area would result in community benefits, the Coosa Valley Resource Conservation and Development Council provided technical and financial

assistance for establishing vegetation.

Davis Robbins, coal company owner, began smoothing and preparing the spoil banks for revegetation in June 1972.

For the next 4 years, a bulldozer worked nearly full time on the project.

Of the 600 acres surface mined on Altoona Mountain over the last 30 to 40 years, 400 acres have been seeded to sericea lespedeza and weeping lovegrass on the more level areas. These grassed areas are now well established and will be used for seed production and livestock grazing.

Loblolly pine seeds were broadcast by helicopter on the 200 acres of steep back slopes. In several years the pines will be large enough to provide needed erosion control.

Road and street maintenance along the streams already has been drastically reduced.

Robbins also planned a 100-acre

orchard, of which 20 acres are now planted to apples, peaches, grapes, and blueberries.

Four small lakes serve as settling basins and a 17-acre lake is used for fishing in the mined area. Wildlife food and cover have attracted bobcats, a cougar, wild turkeys, and quail.

During a visit to the mined area, I remember noticing the land was being smoothed more than it usually is for stabilization. I commended Robbins on the good job, noting that he was doing more than was needed to meet minimum specifications.

His reply: "Sam, I want to fix this place up before I pass on so people won't say 'Davis Robbins came in and got all he could and left the place in a mess.'"

Mr. Geiger is SCS district conservationist, Gadsden, Alabama.

Opening the Classroom Door

by F. Dwain Phillips

If you want students to appreciate the outdoors, reasons an Oklahoma professor, you have to get the teachers involved in outdoor activities themselves. Here's how he's done it.

Sixty teachers who spent 4 weeks on environmental studies in Oklahoma this summer were truly inspired to start outdoor classrooms at their schools.

The inspiration was provided by Dr. Don Kellogg, who taught the session. He gave each teacher a grade of "Incomplete" until work on outdoor classrooms started.

"The only way to get teachers to take their students outdoors is to get the teachers involved in outdoor activities themselves. That is what the course is designed to do," said Dr. Kellogg, director of the Science Education Center at East Central University at Ada.

The first 2 weeks were spent at three centers—Ada, Stillwater, and Tulsa. Classwork included curriculum analysis, development of lesson plans, earth science, and conservation. The teachers spent the final 2 weeks at Camp Goddard learning more about canoeing, camping, backpacking, fishing, and photography. The studies ended with a day in the field with 14 SCS district conservationists, putting the final touches on outdoor classroom plans.

Learning experiences varied. The teachers inventoried "eco-plots" and recorded changes in plant and animal life daily for 2 weeks. They used soil surveys to help locate clay soils which then were fashioned into pots, bowls, and other "objets d'art."

In addition to Dr. Kellogg, instructors included Dr. Ted Mills at Stillwater and John Roller at Tulsa. Resource specialists from the Forest Service, Oklahoma Department of Wildlife Conservation, and SCS provided technical help.

Of the 60 teachers enrolled in the course, 57 were on scholarships provided by various conservation districts and the Oklahoma Conservation Commission. Last year, 20 of the 26 teachers enrolled were on district scholarships.

After taking the course, 21 of the 26 teachers have inaugurated conservation and environmental studies in their schools; 15 new outdoor classrooms are underway.

One member of the 1975 class, Dan Sebert, gave up teaching to become a conservation education specialist. He now is employed by the Oklahoma Conservation Commission, working with districts and teachers throughout the state.

Mr. Phillips is SCS public information officer, Stillwater, Oklahoma



Backpacking . . . overnight camping . . . making pottery from clay found through a soil survey were "classwork" for teachers studying conservation education.

Reviews

Untaxing Open Space.

By the Regional Science Research Institute for the Council on Environmental Quality. 1976. 401 pp., illus. Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 \$5.40 full report; \$0.45 for the Executive Summary.

This report evaluates the effectiveness of the state statutes authorizing differential assessment of farmland and open space lands. Well written and well documented, it should serve as a standard reference on the subject. Detailed analyses of nine states are included in the full report. A short summary is also available.

Differential assessment laws are now in effect in 42 states to ease the property tax burden on farmland and open space. This report evaluates the strengths and weakness of the three different approaches these laws take: preferential assessment, deferred taxation, and restrictive agreements.

The basic problems which gave rise to these laws are the inequity of real property taxes levied on speculative market values rather than actual current use values and the difficulty of preserving productive agricultural lands and open spaces for food and fiber production and for esthetic enjoyment.

The report concludes that differential assessment laws, in general, work well to reduce the tax burden on farmers and owners of open space. However, acting alone, they are not very effective in preserving agricultural uses and open space. Additional land use control programs by state and local governments are needed to solve the agricultural and open space preservation problems.

—**Warren T. Zitzmann, SCS community planner, Washington, D.C.**

Meetings:

October

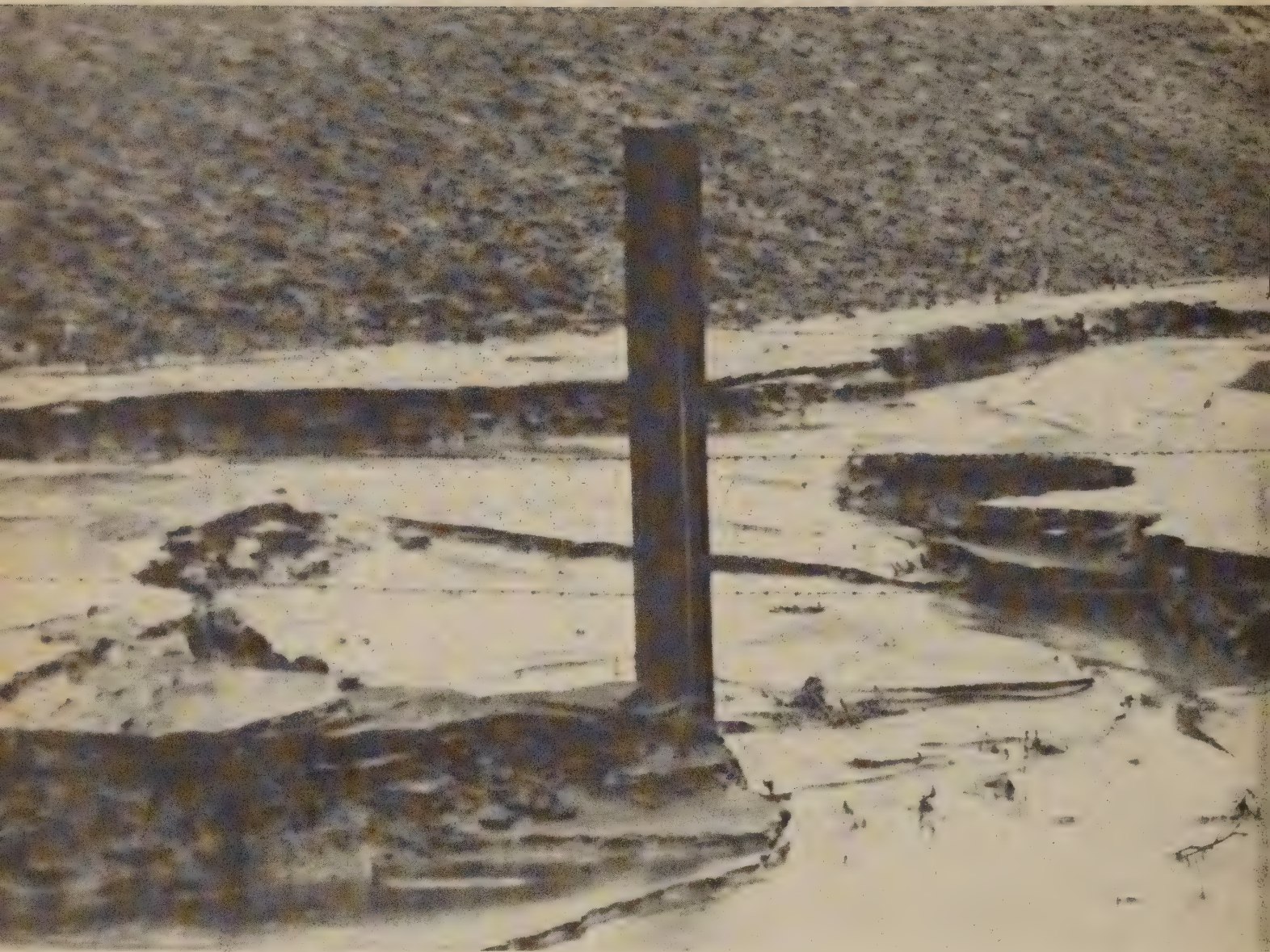
- 2-5 Farm and Industrial Equipment Institute Convention, Boca Raton, Fla.
- 2-6 American Bankers Association, Washington, D.C.
- 3-8 Water Pollution Control Federation, Minneapolis, Minn.
- 12-15 Annual Meeting of the Hardwood Plywood Manufacturers Association, Toronto, Canada
- 14-17 National Association of Biology Teachers, Inc., Denver, Colo.
- 17-20 American Forestry Association, Disney World, Fla.
- 17-21 National Recreation and Park Association, Boston, Mass.
- 18-20 American Plywood Association Industry Meeting, Biloxi, Miss.
- 23-27 National Environmental Sanitation and Maintenance Educational Conference and Exposition, Boston, Mass.

November

- 7-10 National Forest Products Association, Scottsdale, Ariz.
- 7-10 Sprinkler Irrigation Association Convention, Newport Beach, Calif.
- 8-9 Fifteenth Annual Purdue Air Quality Conference and Exhibition, Indianapolis, Ind.
- 8-11 Geological Society of America, Denver, Colo.
- 8-15 The National Grange 110th Annual Session, Atlantic City, N.J.
- 9-12 Future Farmers of America, Kansas City, Mo.
- 14-17 National Association of State Universities and Land Grant Colleges, Washington, D.C.
- 14-18 National Association of State Departments of Agriculture, Phoenix, Ariz.
- 15-17 American Association of State Highway and Transportation Officials, Birmingham, Ala.
- 16 American Seed Trade Association, Inc., Kansas City, Mo.
- 18-22 Adult Education Association of the U.S.A., New York, N.Y.
- 24-27 National Council for Geographic Education, San Francisco, Calif.
- 28-30 American Society of Farm Managers and Rural Appraisers, St. Louis, Mo.
- 28
- Dec 1 World Wildlife Fund Fourth International Congress, San Francisco, Calif.
- 28
- Dec 2 American Institute of Chemical Engineers, Chicago, Ill.
- 28
- Dec 3 American Society of Agronomy, Crops Science Society of America, and Soil Science Society of America Joint Annual Meeting, Houston, Tex.



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The Sound of Conservation

From the Administrator

Thanks mainly to the clock radio and car radio, the medium of radio has not only survived the TV age, but it has actually gotten bigger, both in number of stations and total audience. Millions of people every day wake up to radio, listen to it while driving back and forth to work, and, if they are teenagers, even go to sleep with it.

The Soil Conservation Service uses radio to talk to the American public about soil and water conservation. Each week our field people, district supervisors, and cooperators participate in an untold number of broadcasts, many of them farm shows. USDA's Office of Communication sends out more radio materials, many of them interviews with conservationists.

In addition, SCS issues, from time to time, recordings of short "public service announcements," or PSA's, which are played without charge by local stations. The discs, each containing 8 or 10 assorted PSA's, are distributed by district conservationists, who personally deliver them to local radio stations.

The act of handing over a disc serves two useful purposes. First, it brings our PSA's directly to the attention of station managers, who might otherwise fail to listen to them. Second, it gives the district conservationist a chance to get acquainted with station personnel and to explore the possibilities of other programs.

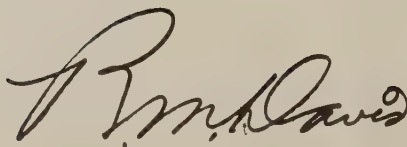
This month a new disc of eight 30-second PSA's is being mailed to field offices. It should be delivered promptly; a second disc is already in production and will be mailed right after Christmas.

Like many of our earlier PSA's, some of the new ones are humorous, to catch the ear of disc jockeys and listeners. However, the messages they contain are serious. They include: (1) help preserve prime farmland for agriculture; (2) check the soil survey before you buy or build; (3) increase wildlife with conservation practices; and (4) do something now to stop soil erosion and improve the environment.

A number of the new spots mention conservation districts as well as SCS.

Once again, our "voice of conservation" is Bill Hart, a long-time friend of districts who is an announcer for Station WCAU in Philadelphia.

We hope through continued use of radio to tell millions of Americans about the merits of conservation, including many people who might not otherwise learn about soil erosion and our programs to combat it.

A handwritten signature in dark ink, appearing to read "R. M. Davis". The signature is fluid and cursive, with the first letters of each word being capitalized and prominent.

Soil Conservation

Soil Conservation is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil Conservation* has been approved by the Director of the Office of Management and Budget through July 31, 1978.

John A. Knebel
Acting Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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Washington, D.C. 20402.

Cover:

Virginia's barrier islands are one of the natural areas in which the Soil Conservation Service is assisting The Nature Conservancy in ecological studies. See story on page 12.

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Chicago's New Flood Control Study

A recently completed flood protection study for the Chicago metropolitan area emphasizes nonstructural measures and includes imaginative structural designs. One of two all-urban river basin studies in the country, it is designed to control flooding that causes more than \$6 million in damages a year—a figure expected to double by the year 2000 unless action is taken.

Faced with steadily increasing floodwater hazards, the Chicago metropolitan area has launched a program to protect more than 11,000 homes and save millions of dollars annually in flood damages.

Its Chicago metropolitan area floodwater management study specifies improvements—some already underway—to reduce overbank flooding by 90 percent in the 1,142-square-mile Chicago river basin area.

"When the plans in the study are fully implemented, the impact will be tremendous," said Daniel E. Holmes, SCS state conservationist in Illinois. "They will offer 100-year-frequency flood protection to more than 11,000 homes and nearly 500 businesses. They will yield annual flood control benefits of more than \$10 million, plus about \$2 million in recreation benefits."

Holmes spoke at dedication ceremonies for the study last June at its first floodwater retarding structure, Busse Woods Reservoir, already half completed.

The Chicago metropolitan area floodwater management plans are the result of a 5-year cooperative river

basin study under the leadership of the Soil Conservation Service. More than 100 organizations and units of local, state, and federal government have participated in the study, which was requested by the Metropolitan Sanitary District of Greater Chicago (MSDGC).

The floodwater management plans contain both environmental and economic goals. They emphasize non-structural flood control measures and imaginative designs for structural measures.

For example, nearly 5,000 acres of wetlands and more than 3,300 acres of stream corridors will be preserved. Recent urban development of these natural floodwater storage areas is one cause of Chicago's increasing flood problem.

State and local governments have enacted stringent regulations on further building and development on the flood plain. Already a mobile home park has been relocated out of the flood plain, and businesses are moving to less susceptible locations.

Other nonstructural measures are: floodproofing more than 475 buildings, controlling erosion on more

than 100,000 acres of agricultural land and 5,000 acres of land under development, and protecting more than 10,000 acres of upland forest.

Structural plans call for 28 reservoirs capable of storing 12.6 billion gallons of floodwater. Because this urban area has few suitable sites for dams, however, many of these reservoirs will be dugouts or abandoned sand and stone quarries. The largest will be 20 surface acres and 150 feet deep. The excess water will flow into the dugout and quarries and be pumped out after the danger of flooding has passed.

The larger reservoirs will also be used for recreation. One deep limestone quarry, for instance, will become the main attraction for a park. It will be partly filled with spoil from the dugouts and will be maintained with enough water for fishing, boating, and swimming. Its recreational potential will be enhanced by baseball diamonds, tennis courts, and picnic areas along the shore.

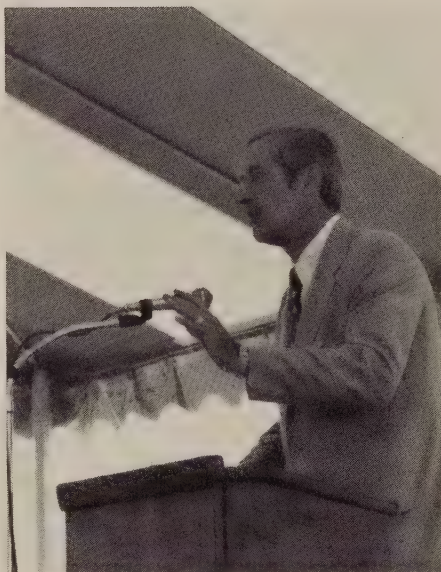
The floodwater management study was started in 1971, after the Metropolitan Sanitary District of Greater Chicago requested a cooperative river basin study of the six watersheds draining into the Chicago area. SCS led the study, which also involved USDA's Forest Service and Economic Research Service, the MSDGC, and the State of Illinois.

Voluntary steering committees represented soil and water conservation districts, municipalities, and citizens' groups in each watershed. Each committee organized neighborhood meetings to coordinate the planning efforts of government agencies with the needs and desires of local citizens.

The steering committees helped resolve conflicts between various agencies and interest groups, solicited comments from individuals and businesses, and held public hearings on the floodwater management study once a draft was written and circulated.

Each watershed plan was made separately; then all were integrated to form the final floodwater management plans for the entire area, which includes parts of five counties in

At last summer's dedication, Assistant Secretary Robert W. Long characterized the plan as unique because it cut across economic, legal, and political lines to deal with a regional problem.



Robert W. Long, Assistant Secretary of Agriculture for Conservation, Research and Education.

northeastern Illinois, two counties in southeastern Wisconsin, and one county in northern Indiana.

Existing federal, state, and local programs affecting flood control were integrated into the plans through close cooperation among governmental units, the steering committees, and the public. For example, MSDGC's Tunnel and Reservoir Plan for collecting sewer overflow will store all the rain that falls on built-up areas. After a storm, the stored water will be pumped back through treatment plants before it is discharged into watercourses.

SCS helped prepare the floodwater management study under Section 6 of P.L. 566, the Watershed Protection and Flood Prevention Act, as amended. MSDGC and SCS shared the \$2.9 million cost.

Because of its scope and the extensive public participation, the Chicago metropolitan area floodwater management study is attracting national attention. At last summer's dedication ceremony, Robert W. Long, Assistant Secretary of Agri-

culture, characterized it as unique because it cut across economic, legal, and political lines to deal with a regional problem.

As principal sponsor of the study, MSDGC received a 1976 Merit Award from the Soil Conservation Society of America. Tom Hamilton, chairman of the Chicago Metropolitan River Basin Council of Steering Committees, was named "Watershed Man of the Year" for 1976 by the National Watershed Congress. And for completing the study on schedule and within the budget, the SCS river basin planning staff headquartered at Lisle, Illinois, received merit awards from SCS.

Four members of the SCS river basin planning staff have been assigned to the MSDGC for 2 years under the Intergovernmental Personnel Act to help implement the plan.

Construction has already started on one of the six watersheds, the Upper Salt Creek, under SCS's Small Watershed Program. Sponsors of another watershed plan have also applied to SCS for financial assistance.

Of the remainder, the U.S. Army Corps of Engineers has been requested by Congress to implement one, and state and local government funding is planned for those requiring mainly nonstructural flood control measures.

The total installation cost for implementing the floodwater management plans is projected at \$200 million. But sponsors agree that flood control in this area of 7.5 million people is well worth the cost.



The Days After Teton

No one yet knows precisely what caused the Teton Dam to collapse.

The answer is expected to come from the two teams conducting investigations.

SCS is part of the Department of the Interior Teton Dam Failure Review Group, serving with the U.S. Army Corps of Engineers, U.S. Geological Survey, the Tennessee Valley Authority, and the Bureau of Reclamation.

Nine engineers and geologists were also appointed by the Secretary of the Interior and the Governor of Idaho to the Independent Panel To Review Cause of Teton Dam Failure.

The Teton Dam disaster touched most federal agencies in some way—and the Soil Conservation Service was no exception. The Bureau of Reclamation dam failed on Saturday, June 5, 1976. Richard J. Gooby, SCS area conservationist, Pocatello, Idaho, gives his personal account of the devastating flood and the events that followed.



June 5, 11:57 a.m.: Teton Dam collapsed, spewing 250,000 acre-feet of water along a 100-mile stretch of Teton and Snake Rivers.

Raging water, up to 60 feet deep, ripped through Madison, Jefferson, Bonneville, Fremont, and Bingham Counties—destroying homes, offices, equipment, animals, crops, and lush farmland.

I had been archery-fishing and learned about the disaster when I arrived home at 7 p.m. I was greeted with the news that Rexburg was under water, and the flood crest was working its way to Idaho Falls. SCS has field offices in both towns. I tried to telephone the district conservationists, but phone service was out.

June 6: I headed for Rexburg early this morning to check on our people and the office. The water has subsided, leaving the town in a sea of mud and debris.

In town, I passed an SCS pickup wrapped around a light pole; farther down the street, another SCS rig

had ended up in a store window. Four SCS vehicles are damaged beyond repair.

The field office is still standing, but its contents have been thoroughly rearranged. Six feet of water entered through the back door and left by the front door, dumping 4 inches of silt and wrecking furniture and files. A 5-pound carp was lying in the middle of the floor.

Crews began clearing the Rexburg office, the only SCS office damaged in the five-county disaster area.

All SCS personnel are accounted for except Jerry Pickett, district conservationist. We tried to get out to his home about 6 miles from Rexburg, but bridges are out. With no phone service, there is no possible way to find out if he and his family have made it safely through the flood.

Farther downstream, Blackfoot, Shelley, and Firth residents are preparing for the flood crest. Roberts suffered heavy damage.

President Ford has declared eastern Idaho a national disaster area.

June 7: Phone service was still not restored.

I tried to get into the flooded cropland area, but roads are washed out. Travel is impossible.

Bank stabilization work done early last spring along the Snake River near Blackfoot has been severely tested: all of the rock riprapped banks were overtopped by several feet of water. Even though damaged, these measures, authorized under Section 216 of the Flood Control Act of 1950, were effective in minimizing bank erosion.

June 8: We were relieved to see Jerry Pickett, who finally managed to make his way into Rexburg. He and his family are all okay.

June 9: Amos Garrison, SCS state conservationist, and Creighton Gilbert, SCS assistant state conservationist for water resources, flew to Idaho Falls with the State Defense Committee and John Knebel, Under Secretary of Agriculture. We met with the Federal Disaster

Assistance Administration (FDAA), U.S. Department of Housing and Urban Development, about a mission assignment for SCS. FDAA heads the federal disaster assistance program.

June 10: FDAA mission assignments finalized. SCS is to contract for debris removal from private farm property and restore on-farm irrigation systems where salvageable crops exist.

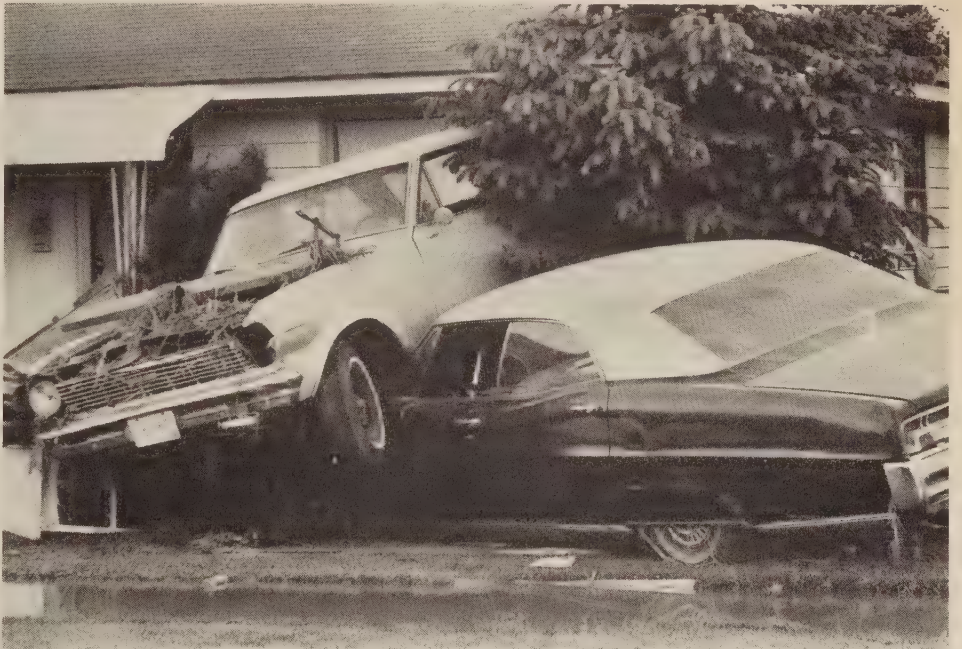
We estimated that 940 farms and rural residences will be involved. Damage survey reports will have to be made for each to determine immediate emergency work needed, as well as permanent work to be done later under Emergency Conservation Measures.

Authorizations for debris removal will have to be signed by property owners before contracted clean-up work can begin. The Agricultural Stabilization and Conservation Service agreed to match SCS personnel with an equal number of its people to obtain the needed damage survey reports and landowner signatures. Twenty crews were set up to do the work.

We flew by helicopter over the flooded area. Approximately 128,000 acres have been flooded. More than 300,000 acres of irrigated land, untouched by the flood, are without water because of damage to irrigation canal systems. The Bureau of Reclamation received an FDAA assignment to repair canal systems. The Corps of Engineers' assignment is to repair dikes, cut off overland flow of water, and clean debris from cities.

FDAA service centers have been set up in four of the counties to aid disaster victims. SCS has employees at the centers 7 days a week. I will be attending daily meetings with representatives from all federal agencies involved to give FDAA up-to-the-minute reports on mission assignments. The meetings will provide the opportunity to iron out any problems encountered as the clean-up work progresses.

SCS state conservationists in Oregon, Wyoming, and Utah offered to send employees to assist us.



Photos on this and facing page indicate the devastating results of the collapse.

In town, I passed an SCS pickup wrapped around a light pole; farther down the street, another SCS rig had ended up in a store window. Four SCS vehicles are damaged beyond repair.

SCS's immediate assignment was to contract for debris removal from private farm property and restore onfarm irrigation systems where salvageable crops existed. Emphasis now is on river channel work to reduce flooding next spring. The capacity of the Teton River is half what it was before June 5.



June 14: Thirteen Idaho SCSers were detailed into the area to help our 35 SCS employees. We worked Saturday and Sunday, and no one remembers what an 8-hour working day is.

June 16: We've estimated that damaged farmland will be up to only 65 percent of normal production this year, and as many as 10,000 acres of farmland could have been permanently destroyed. Much of the topsoil has been stripped away, leaving only a gravel surface.

June 21: Ten SCS employees from Oregon, Wyoming, and Utah arrived to assist with damage survey reports and serve as contract inspectors for the debris removal work.

June 22: We received authorization from the Administrator of SCS to use \$1.5 million of emergency assistance funds in the damaged area. The proposed emergency work will be clearing, snagging, and removing gravel bars from approximately 20 river miles and placing rock riprap at selected sites.

The Corps of Engineers will arrange for installation of these Section 216 measures on a reimbursable basis. They already have engineers and contractors mobilized in the area, which will save time and money for the government.

June 24: FDAA amended our mission assignment regarding reimbursement, increasing it from \$1 million to \$2.8 million. It enlarged the SCS mission assignment to include removal of large debris from all rural lands.

June 25: A debris contractor turned over a railroad boxcar. Two cows and a bull walked out; they had been in there 20 days.

July 2: FDAA again amended the reimbursement amount for costs incurred, increasing it to \$4.7 million. Work should be completed no later than early September.

The period of emergency work is about over, but there will be years of work ahead requiring SCS technical assistance—land leveling, planning irrigation systems, deep plowing . . .

July 6: SCS continued debris clean-up work. Over \$3.5 million in contracts have been let. Some trucks are hauling 35 to 40 loads of debris per day.

July 23: FDAA again amended the reimbursement amount, increasing it to \$6.7 million.

July 25: All but 2 percent of the irrigated farmland affected by the dam collapse is getting water again, according to Bureau of Reclamation officials.

July 26: The period of emergency work is about over, but there will be years of work ahead requiring SCS technical assistance—land leveling, planning irrigation systems, deep plowing, etc.

August 3: SCS state conservationists from California, Washington, and Oklahoma have agreed to send personnel to assist in the cleanup effort.

August 9: Madison and Fremont Counties have let contracts under the Section 216 program to remove large debris from the Teton River. The debris includes vehicles, farm machinery, and even a schoolbus.

August 11: The United States Army received a mission assignment to bring in a Chinook helicopter to help us remove debris from areas accessible only by air. We flew the area and counted 52 propane tanks, hundreds of barrels, along with vehicles and machinery. The helicopter can lift 12,000 pounds.

September 1: The helicopter has removed nearly all the debris in its assigned 3-acre area. Some days it hauled nearly 170,000 pounds.

September 3: All the FDAA debris removal contracts were shut down today. Some debris in set areas will have to wait until late fall before it's dry enough to be removed.

September 7: There is a tremendous emergency cost-share workload under ASCS in the five counties. We will be up to our ears in requests for a long time.

September 8: SCS received an advance from FDAA for \$3,060,000 to perform the needed river channel work this fall so flooding will be reduced next spring. The river's capacity is half what it was before June 5. The Corps of Engineers started today to remove gravel from the south fork of the Teton River under a continuation of the arrangement with SCS. Plans are nearly completed for all the river work.

Some of the area will never be restored. We have documented damages with many photos, both from the air and on the ground. Some of the damage is almost beyond comprehension in the most severely affected areas.

Collapse of the earth-fill dam, which was filling for the first time this spring, has been reported as one of the worst dam disasters in world history in terms of property damage. By comparison, it was miraculous that only 11 persons lost their lives.

Over 3,300 residences were destroyed or damaged. A number of farm families have not located even a small portion of their homes or belongings.

Wilbert Trupp, Yellowstone Soil Conservation District supervisor, has a single birch tree left to identify what used to be his farmstead.

by Anne Zack

Preserving Virginia's Barrier Islands



Carried with the ocean waves, migrant sands bury the enduring remnants of man's intrusion. Conservationists monitor nature's return to sovereignty over this Virginia island chain.



Leaning forward in his rocking chair on the veranda of the Wachapreague Hotel, the innkeeper pointed beyond the marina, across the maze of marsh grass and water, to a long dark streak on the horizon.

"That's Parramore Island. All that's left there is a wrecked ship's hull and the Coast Guard station," he said. "Off to the north is Cedar Island. There's nothing there but some summer cottages and an old car somebody ferried out to the island and then just abandoned it on the beach."

There's not much left on any of Virginia's barrier islands—not much man created, that is. The Nature Conservancy intends to keep it that way.

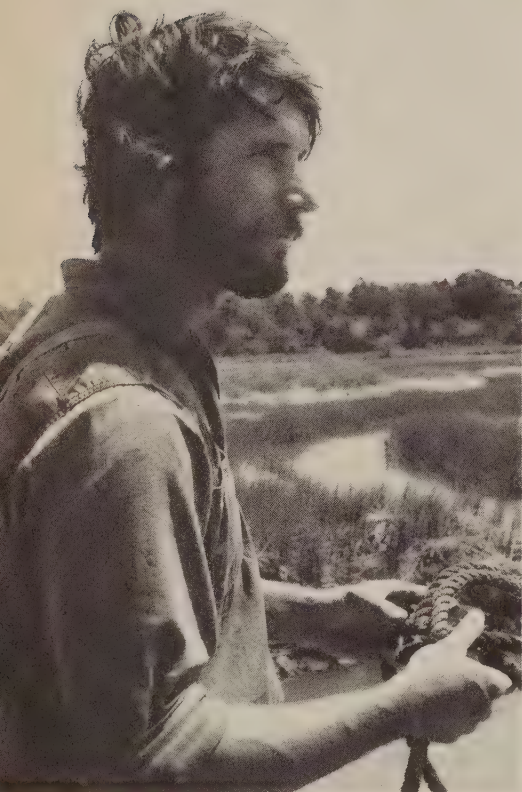
Since 1951, the nonprofit Conservancy has acquired and preserved important natural lands in 48 states, Canada, and the Caribbean. The Conservancy is a privately funded corporation with membership open to the public. It is involved in nearly 1,500 preservation projects—from tropical rain forests in Hawaii to Adirondack trout lakes.

"The Soil Conservation Service has teamed up with the Conservancy on several hundred projects, and our people are closely involved with the local conservation districts," said Ray Culter, head of Land Stewardship for the Conservancy. "Since 1973, SCS has made detailed soil surveys of 80 projects for us."

SCS and district people have helped The Nature Conservancy identify natural areas that should be preserved, such as a cypress swamp near Charleston, South Carolina. They also have helped the Conservancy plan management of projects, setting up a grazing plan for a wildlife range south of Albuquerque, New Mexico, for example.

The barrier islands project involves a 42-mile chain of nine islands along the Delmarva Peninsula, which Virginians call the Eastern Shore. The Virginia islands are the only undeveloped chain of barrier islands along the nation's East Coast.

"We became interested in the islands during the late 1960's," said Rod Hennessey, director of the Con-



servancy's Virginia Coast Reserve. "Developers wanted to build a major resort center here and have the state construct a bridge to connect the islands to the Eastern Shore."

The organization purchased 33,000 acres, more than half the land on the islands, for \$4.5 million, according to Hennessey. "Now we have a say in plans for all nine of the islands—from Metomkin Island south to Smith Island, near the Chesapeake Bay bridge-tunnel."

The esthetic value of preserving islands is obvious, but The Nature Conservancy has other reasons as well. This area where land meets sea and saltwater meets freshwater is one of the richest ecosystems in the world. Almost all the finfish and shellfish harvested by the Eastern Shore's \$7-million-a-year seafood industry depend on coastal wetlands like these at least part of their lives. Oysters, clams, and crabs spend

Rod Hennessey, director of The Nature Conservancy's Virginia Coast Reserve, ties up at an old dock on the marsh side of Parramore Island.

their entire lives in the marsh estuary system, feeding off particles of deteriorating marsh grass.

The rich aquatic life of the coastal wetlands and dunes provides excellent feeding, resting, and nesting areas for well over 200 species of waterfowl and shorebirds. The marshes are the state's only breeding sites for the Forester's tern, willet, and laughing gull. Royal terns summer on Virginia's barrier islands and winter in Peru. Canada geese and a variety of ducks winter here and summer farther north.

Once the land was purchased, the Conservancy launched the 2-year Virginia Coast Reserve Study to determine the best way to manage it. One part of the study covered legal aspects of acquiring land; another part detailed social and economic effects of management alternatives on the communities of the Eastern Shore. A third part, a volume 3 inches thick, documented the ecological value of the islands.

The Nature Conservancy asked SCS to conduct a detailed soil survey



The building and tearing away of the barrier islands continue today. At left, American beachgrass is the first plant to take hold on the northern end of Parramore Island, which is building with deposition from the southern end of Cedar Island. Above, a forest once on the interior of the island was exposed when protecting frontal dunes were eroded; it is now a "ghost forest." At right, amongst the dead trees, salt-tolerant grasses maintain their foothold and slow erosion.

Photos by Don Schuhart.

Besides the obvious esthetic value of the islands, this area where land meets sea, and saltwater meets freshwater, is one of the richest ecosystems in the world.

and vegetation study for the Virginia Coast Reserve Study. The soil survey and vegetation study are part of an inventory of the island resources and are being used to plan management of the islands as well.

Louis Cullipher, SCS soil scientist, strolled along the beaches, crawled through waxmyrtle thickets, and sloshed through marshes sidestepping snakes and slapping at mosquitoes as he sampled the island soils and drew their boundaries on black-and-white aerial photographs. He then used color infrared photographs from the National Aeronautics and Space Administration to correlate soils information with vegetation data.

The vegetation on the islands varies from a few sprigs of salt-tolerant grass along the sea to a maritime forest of 80-year-old pines on the relict back dunes of Parra-

more, the largest of the islands. The type of vegetation depends on salt spray, frequency of overwash, protection by dunes, and soil wetness. Only grass grows on the excessively drained soils; both grass and shrubs grow on the wetter soils.

"There are two kinds of 'ghost forests' on Parramore and some of the other islands," said Cullipher. "Changes in the water table have killed redcedars on the marsh side. On the ocean side, erosion has eaten away at the beach, and the salt spray has killed trees that were once protected by sand dunes and shrubs."

Cullipher said the ghost forests and traces of marsh soils on the beaches are evidence that the islands are continually creeping westward.

The islands "move" because of prevailing winds and ocean currents.

Wind picks up the dry sand easily, building dunes in some places and eroding them in others.

Ocean waves also move the islands westward. In summer when wave action is strong, beaches retreat as the waves tear sand away. In winter when wave action is milder, the beaches build up somewhat as sand accumulates, thus maintaining a fragile balance.

Although the westward movement is generally inch-by-inch, it can be dramatic. During the "Ash Wednesday Storm" of 1962, for instance, wind and waves moved Metomkin Island several hundred feet west in a few hours.

The islands move northward as well as to the west. Waves break on the beaches at an angle, creating a longshore current, or littoral drift, parallel to the beach. The southward current picks up sand from the south end of one island and deposits it on the north end of the next. The islands work together in the chain. If a jetty or some other permanent structure is used to stop



erosion on one island, the next island south is robbed of deposition and erodes away much faster.

"That's one reason The Nature Conservancy opposed developing the barrier islands," Hennessey explained. "Development won't stop the islands from moving, and in the end, damage caused by the gradual movement and storms could cost more than the income a resort would generate to the area."

Although some Conservancy holdings are leased, sold, or donated to government agencies, universities, or sister conservation organizations for preservation, the Conservancy will keep and manage the barrier islands itself.

"Based on the resource study, the board of directors decides whether to keep a project and how to manage it. It generally just says 'keep it natural.' Our professional staff uses the study to decide exactly how to go about doing so," Hennessey said.

The first objective for the barrier islands is to return them to their natural state. The Conservancy has

The current picks up sand from the south end of one island and deposits it on the north end of the next. In this way, the islands work together in the chain.

asked Eastern Shore people to remove their cattle and sheep, which graze on the islands. It also is eliminating game animals introduced by hunting clubs of the late 19th and early 20th centuries.

"For example," said Hennessey, "there are a lot of black-tailed jack-rabbits from Kansas here, and who knows how we'll get rid of them!"

The Conservancy also anticipates a few problems with some of the animals native to the islands. The deer herd on Parramore Island, for instance, is overbrowsing the plants, stripping foliage from greenbriar, grape, and redcedar up to a height of 4½ feet, according to Cullipher.

"We've done some limited harvesting of the deer," said Hennessey, "but herds naturally go through a boom-bust population cycle. The current theory in wildlife management

is that since this area has little interference by man, the vegetation will adjust and the herd will regulate itself through the boom-bust cycle."

Eventually, the Conservancy will use the barrier islands for research and education. Here, scientists and college students will be able to study all aspects of natural coastal systems at work—geology, soils, vegetation, and wildlife. Old Dominion College of Norfolk, Virginia, has already approached the Conservancy about starting a barrier islands research station.

"We're also considering some public daytime recreation use of the islands, where it won't destroy the beaches and bird colonies," Hennessey added.

Cullipher interpreted the soil survey information for several uses, including sanitary facilities, roads,



Above: American beachgrass is a "natural" in the formation of sand dunes. It traps blowing sand and, as on the northern end of Parramore Island, begins to form a new line of frontal dunes.

At right: Saltgrass marsh extends from the barrier islands to Virginia's Eastern Shore (top photo). A freshwater marsh on the interior of Parramore Island is bordered by 80-year-old pines on relict dunes (bottom photo).



small buildings, source material, water management, and recreation. For instance, he pointed out that vehicles would destroy vegetation that holds the loose beach sand in place and create a wind erosion problem. In the interior marsh areas, vehicles would compact the soil and cause water to pond.

"We also plan to use the soil survey to help define ecologically sensitive areas. We'll combine it with geological and biological data to make sensitive area maps," Hennessey said.

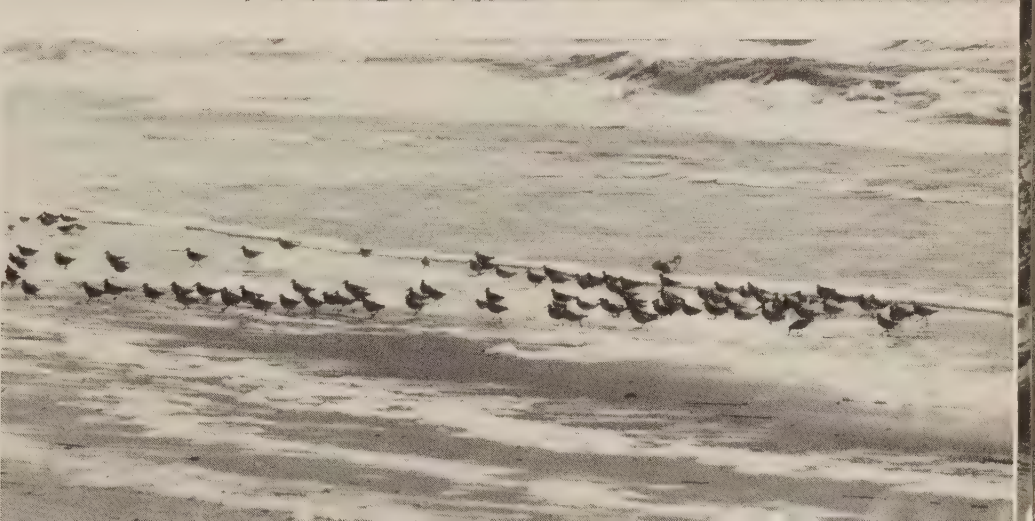
On the barrier islands, as on The Nature Conservancy's other projects, however, preserving the natural environment outweighs man's using the land. By keeping them natural, the Conservancy hopes these islands will continue to provide a haven for wildlife and protection for the rich marshlands that support the Eastern Shore economy.

Ms. Zack is a staff writer, SCS, Information Division, Washington, D.C.



SCS soil scientist Louis Cullipher takes a sample of Newhan sand on the northern end of Parramore Island.

At right: Tracks of white-tailed deer on Parramore Island, where the herd is overbrowsing on plants such as green-briar, redcedar, and grape (top photo). Shorebirds are abundant on the islands, where they chase receding waves to pick out mussels and other food before the next breaker can catch them.



Yesterday's

B a r r i e r I s l a n d s

by Maria Ann Graham

Virginia's barrier islands look much as they did 400 years ago, when the Matchipungo Indians of the Eastern Shore canoed across Broadwater Bay to harvest clams and oysters on them. But the islands have seen plenty of action between then and now.

The Eastern Shore of Virginia was one of the first areas settled in the New World, and throughout the 17th century its population swelled with tobacco and cattle farmers. By the second half of the century, the farmers discovered they could release cattle on the barrier islands to forage and reproduce untended. One after another, the islands were used mainly for grazing for the next 100 years.

Although a few settlers ventured to Hog Island shortly after the Revolutionary War, Cobb Island was the center of activity during the 19th century. Nathan Cobb, a Massachusetts shipbuilder, bought the island and moved his family there, salvaging ships wrecked on the shifting shoals.

Island settlers always had lived by collecting eggs in spring, fishing in summer, and hunting in fall and winter, but Cobb and his sons were the first market hunters. They killed ducks by the hundreds, packed them in barrels, and shipped them to the finest hotels of New York and Philadelphia.

By the late 1800's, Cobb Island itself was the site of a lucrative hotel business, hosting wealthy mainlanders who came to hunt, fish, and swim. But a series of storms pounded the coast, and by 1897 the resort was gone.

Meanwhile, small settlements, hotels, and lifesaving stations sprang up on the other barrier islands.

In the late 19th and early 20th centuries, lavish hunt clubs were established on several of the islands by rich businessmen who wanted retreats. Grover Cleveland was a frequent visitor, among other famous people.

Sport hunting boomed, and market hunting continued unchecked until it was outlawed in the early 1900's, only to be replaced by illegal duck trapping. To improve shooting, the hunt clubs controlled natural predators and stocked game, often exotic forms.

Storms continued to shift the island sand, reform the marshes, and undermine the elegant club houses. The great hurricane of 1933 and the Depression finally brought the hunt club era to an end.

Island settlements met a similar fate. By 1930, for example, 40 or 50 homes, a school, and a church nestled in a pine wood formed the village of Broadwater on Hog Island. The sea had inched closer and closer for years, but the village's destruction came in 1933, when the hurricane submerged the island and forced its inhabitants to float their houses and belongings to the mainland on barges. By the 1950's, the sea was lapping at the gravestones in the village churchyard. Today, not a trace remains of the village or the pine woods.

Ms. Graham is a freelance writer. This article is condensed from historical research she prepared for The Nature Conservancy's Virginia Coast Reserve Study.



Once, the lifesaving crew could rush out onto a boat ramp to launch rescue operations. Today, the sand has built up and the ramp is 150 feet from the high tide line.



Photo courtesy of Kellman Doughty.

A hunter and his decoys mark the barrier islands of another century. Hunting—legal and illegal, for sport and for market—boomed on the islands for many years.



Each of the nation's nearly 3,000 soil conservation districts has challenges before it that are unique. On the West Coast, the Pacific Conservation District is battling erosion and sediment to protect a special "cropland"—the estuaries and tidelands surrounding Willapa Bay.

Consider the Oyster

by Bernhardt Rufener
and Richard Murakami

The Pacific Conservation District in southwest Washington has a variety of farming activities going on within its boundaries: raising beef and dairy cattle, managing and harvesting woodlands, growing cranberries in bogs.

But perhaps the most unusual is oyster farming.

This important crop brings \$5 million a year in income to an economically depressed area.

Soil conservation is critical to the industry, which depends on silt-free water and sediment-free oyster beds. Keeping soil in place up in the watersheds is a must.

Oysters are filter feeders and require nutrients in solution as provided in the normal flow of a stream into an estuary. Anything more than normal sedimentation will destroy the oyster beds.

The district tries to keep unusual amounts of sediment out of the streams by better management of logged-over forested areas, stream-bank stabilization on the rivers

The industry depends on silt-free water and sediment-free oyster beds . . . Anything more than normal sedimentation smothers the oysters. Sediment has the same effect on oyster beds that windblown soil has on crops like alfalfa.



At far left, an oyster bed at low tide in Willapa Harbor. Oysters are harvested at high tide with hydraulic or power dredges. Control of soil erosion—and resulting sediment—is critical to the oyster industry.

that have high velocities of water during the winter, and establishment of permanent vegetative cover on critical areas.

The sediment, with its agricultural, residential, industrial, and chemical wastes, is carried by six rivers and their tributaries to the estuaries and tidelands surrounding Willapa Bay, where the oysters are grown.

It covers the oysters, and, in effect, smothers them. It has the same effect on oyster beds that windblown soil has on crops like alfalfa.

The district's concerns are dealt with by use of the Agriculture Conservation Program (ACP) and the Forestry Incentive Program (FIP) managed by USDA's Agricultural Stabilization and Conservation Service. The Cooperative Extension Service, Soil Conservation Service, and State Department of Natural Resources provide expertise.

Through the Forestry Incentive Program, woodland owners get financial help in revegetating logged-over lands with the technical

assistance of the State Department of Natural Resources.

Critical areas on river banks and on road cuts and residential and industrial construction sites are given prompt attention by SCS technicians.

In Pacific County, oyster farming uses about 28,000 acres of tidelands.

Seed oysters—known as spat—are caught by suspending old oyster shells in the tidal currents. The spat attach themselves to shells where they continue to grow. Seed oysters are also imported from Japan and Korea.

The seed oysters are planted in parallel rows in tidelands. Planting areas are staked in rows far enough apart to permit a boat to pass through to scatter seed oysters evenly in the bed.

The seed oysters require little attention the first year after planting.

After that, they must be cultivated regularly to keep proper distribution and break up clusters of shells. A spike-tooth harrow, similar to a huge rake, is used, pulled by hand at low

tide or by tugboat at high tide.

Predatory enemies, such as burrowing shrimp, are controlled to keep the oyster beds in high production.

In about 2 years the oysters are transplanted to fattening beds closer to the mouth of the bay where food is more plentiful and water cleaner.

Oysters are harvested with hydraulic or power dredges—scow-like structures with hoisting engines that manipulate dredge bags over the beds at high tide. An average oyster dredge operation can harvest about 1,000 bushels of oysters per tide, using one operator and one deck hand.

The oyster crop is then delivered to processing plants to be marketed fresh-chilled or steam-cooked in cans.

Mr. Rufener is SCS district conservationist, Raymond, Washington.

Mr. Murakami is Washington Division Manager, Coast Oyster Company, South Bend, Washington.

Title X Teamwork

by Robert K. Kissler

A lot of work needed doing . . . and a lot of people were unemployed. That combination—and Title X, the Job Opportunities Program authorized by Congress—has made its mark in Ohio, where more than 250 people have been hired to work on projects recommended by soil and water conservation districts.



They're leaving a lasting mark in Ohio.

They're doing everything from renovating county fairgrounds to cleaning up streams in a program that's providing temporary employment and training for them . . . and needed improvements for local areas.

They've been hired through Title X, the Job Opportunities Program authorized under the Emergency Jobs and Unemployment Assistance Act of 1974. More than 250 people have been hired under the program in nine Ohio counties—some of

which had unemployment rates as high as 19 percent.

"The program really benefits counties," said Robert Kunkle, Williams County commissioner. "It allows local people to move ahead on valuable projects without a lot of outside restrictions."

The counties have received nearly \$1.2 million for the program from the U.S. Department of Commerce through the Soil Conservation Service. In each county, the board of commissioners administers the funds for projects recommended by local soil and water conservation districts.

The Ohio counties are using Title X funds to improve public areas, building fireplaces and picnic shelters in parks, for example, and to do basic conservation work.

Title X workers have cleared debris from more than 150 miles of streams to improve drainage and reduce streambank erosion and flooding. In Darke County, they cleared more than 60 miles of streams and drainage ditches. The county plans to continue maintenance and improvements after the Title X program ends in December.

Canoeists along the St. Joseph River in Williams County can also testify to the value of Title X work. They're able to paddle through long

stretches of the river for the first time in years—thanks to the removal of log jams by the workers.

Another priority project has been the seeding of critically eroding areas. More than 110 acres of roadbanks and ditches were seeded to tall fescue in Hocking County. In addition, brush was cleared from 61 miles of rural roadbanks to improve visibility.

Several counties have used Title X to improve school grounds by seeding and mulching eroding areas and installing drainage structures.

Just east of the town of Logan, workers concentrated on a 40-acre Land Lab operated by the local school district for teachers and students. They handled jobs too difficult or dangerous for students, such as clearcutting 2 acres for a study of plant succession and selectively harvesting trees.

Management of Title X workers differs from most business situations, commented Arch Hood, Title X supervisor for Holmes County. "We don't want to keep the best men on the job," he said.

In fact, two potential employees never made it: Hood helped them find permanent jobs before Title X work began in the county. Hood schedules work so that employees have time to apply for permanent employment.

Title X projects are supervised by a foreman chosen from the work crew. Conservation district supervisors check the work, and SCS personnel provide technical assistance.

"It's a blessing to receive an outright grant that allows us to improve the employment situation in the county," summed up Otto Shaw, president of the Board of County Commissioners for Hocking County.

"And solving erosion problems and making environmental improvements turn the temporary program into one with permanent benefits for everyone."

Mr. Kissler is SCS public information officer, Columbus, Ohio.

New Publications

Soil Taxonomy

By the Soil Survey Staff, Soil Conservation Service, U.S. Department of Agriculture. 1975. 754 pp., illus. Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. \$17.50 domestic, \$21.88 foreign.

A milestone in soil science, *Soil Taxonomy* sets forth a basic system of soil classification for making and interpreting soil surveys. It is designed for use by soil scientists.

The 754-page book was prepared by the Soil Survey Staff, Soil Conservation Service. Authors include soil scientists from USDA, land grant universities, and many foreign countries. The classification in *Soil Taxonomy* was adopted for use in the United States in 1965. The complete text has undergone little change since an abridged text was given limited distribution in 1973.

The first six chapters present general principles and concepts; the next chapters discuss each of the 10 orders; and the remaining four chapters discuss family and series, application to soil surveys, soils of the United States, and relation to other taxonomies.

The Face of Rural America. The 1976 Yearbook of Agriculture. U.S. Department of Agriculture. 288 pp., illus. Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. \$7.30.

In this Bicentennial year, *The 1976 Yearbook of Agriculture* has departed from tradition.

For the first time since the series started in 1894, the yearbook consists entirely of photographs and captions. Depicting American agriculture in 1976, *The Face of Rural America* features 335 illustrations by more than 50 photographers. In addition, it has departed from its 6-by-8-inch format to a larger 8½-by-11-inch size.

The 288-page hardcover book is available for \$7.30 from government bookstores or from the Government Printing Office. Members of Congress also have a limited supply for free distribution to constituents.

Meetings

October

- 14-17 National Association of Biology Teachers, Inc., Denver, Colo.
- 17-20 American Forestry Association, Disney World, Fla.
- 17-21 National Recreation and Park Association, Boston, Mass.
- 18 Conservation and Research Foundation Annual Meeting, Boston, Mass.
- 18-20 American Plywood Association Industry Meeting, Biloxi, Miss.
- 21-23 Seventh Technical Conference on Irrigation, Drainage and Flood Control, Spokane, Wash.
- 23-27 National Environmental Sanitation and Maintenance Educational Conference and Exposition, Boston, Mass.
- 28-29 American Association for Vocational Materials, Atlanta, Ga.
- 29-
Nov. 1 Forty-Second Annual Convention, National Junior Horticultural Association, King of Prussia, Pa.

November

- 7-10 National Forest Products Association, Scottsdale, Ariz.
- 7-10 Sprinkler Irrigation Association Convention, Newport Beach, Calif.
- 8-9 Fifteenth Annual Purdue Air Quality Conference and Exhibition, Indianapolis, Ind.
- 8-11 Geological Society of America, Denver, Colo.
- 8-15 The National Grange 110th Annual Session, Atlantic City, N.J.
- 9-12 Future Farmers of America, Kansas City, Mo.
- 14-17 National Agricultural Bankers Conference, New Orleans, La.
- 14-17 National Association of State Universities and Land Grant Colleges, Washington, D.C.
- 14-18 National Association of State Departments of Agriculture, Phoenix, Ariz.
- 15-17 American Association of State Highway Officials and Transportation Officials, Birmingham, Ala.
- 16 American Seed Trade Association, Inc., Kansas City, Mo.
- 18-22 Adult Education Association of the U.S.A., New York, N.Y.
- 24-27 National Council for Geographic Education, San Francisco, Calif.
- 28-30 American Society of Farm Managers and Rural Appraisers, St. Louis, Mo.
- 28-
Dec. 1 World Wildlife Fund Fourth International Congress, San Francisco, Calif.
- 28-
Dec. 2 American Institute of Chemical Engineers, Chicago, Ill.
- 28-
Dec. 3 American Society of Agronomy, Crops Science Society of America, and Soil Science Society of America Joint Annual Meeting, Houston, Tex.
- 30-
Dec. 3 Western Forestry Conference, Portland, Oreg.



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The "Best" Conservation Plan

From the Administrator

Sometimes more experienced SCS hands can profit from the fresh, uncluttered viewpoint of a new employee. A case in point is the following report from Mary Kay Dix, a summer aid at the Allentown, Pennsylvania, field office:

"The first morning," wrote Mary Kay, "I went along to gather information for the development of a conservation plan. By way of questions asked and explanations given, I learned the importance of the cooperator's satisfaction with the plan.

"He must supply information on his problems and what he wants to do with his property. If he isn't happy with particular alternatives, then others must be found. It is important that the plan meets the needs of the cooperator, as well as solve a particular problem."

Conservation districts and SCS are concerned over why more conservation plans are not implemented. Mary Kay recognized one major reason when she said that the plan has to meet the needs of the cooperator; it has to satisfy him.

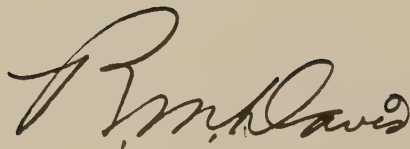
There may be several temporary reasons why a cooperator doesn't turn his plan into visible conservation—lack of funds or equipment, ill health or injury, unsuitable weather. But a more permanent reason for resistance may be that the farmer or rancher doesn't feel his plan really gives him acceptable alternatives.

No plan can be thrust upon a farmer or rancher—it's his plan! The good plan is the one developed with maximum input by the landowner. A soil conservationist can present facts, offer ideas and alternatives, answer questions, and even make suggestions. But he cannot intrude upon the responsibility of the land user to decide for himself which course he will follow.

To transform a plan into visible conservation, a landowner must make commitments of time, money, and materials. He may have to make extensive changes in the physical layout of his place to accommodate new conservation systems—move fences, tear out hedgerows, alter road systems. He may want to try a new system on a few acres before he commits himself to installing it on a quarter section. He may need to change cropping patterns or livestock operations—and these shifts are not often made easily.

We all need to keep Mary Kay's first-day lesson in mind. We need to listen to what the farmer or rancher has to say about his own particular situation. The best plan will be a compromise between what the conservationist may think is best from a technical standpoint and what the landowner feels comfortable with or wants to do. The workable plan blends "ideal" conservation with the realities of food and fiber production in a way that meets SCS technical standards and the landowner's conservation objectives.

The best conservation plan is the one that is put into action and that meets the needs of the landowner and his family as well as protecting the natural resources they manage for all of us.

A handwritten signature in dark ink, appearing to read "J. M. Davis". The signature is fluid and cursive, with a large initial "J" and "M".

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John A. Knebel
Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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Cover:
The pristine Washougal River in
southwestern Washington is a tributary
of the Columbia. With national goals of
clean water, SCS is becoming more
involved in water quality (see story
on page 12).

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When a Pipeline Is Proposed



Billed as one of the largest privately financed projects in the world—at \$8.5 billion—a proposed natural gasline from Alaska's North Slope to the lower 48 states has been the subject of an environmental impact statement that required 2 years to prepare. SCS looked particularly at the possible impacts on agricultural lands.

What would be the impact on the environment if a pipeline for natural gas were built from Alaska's North Slope to the lower 48 states?

That was the question tackled by a federal interagency task force which published its findings in an 11-volume environmental impact statement earlier this year.

The route studied is one of two proposed to deliver natural gas 5,557 miles from Alaska's Prudhoe Bay, which has an estimated 22 to 26 trillion cubic feet of recoverable natural gas reserves, to three points in the United States: Antioch, California; Rye Valley, Oregon; and Delmont, Pennsylvania.

Six major companies have proposed the project: Alaskan Arctic Gas Pipeline Company; Canadian Arctic Pipeline Company, Limited; Northern Border Pipeline Company; Pacific Gas Transmission Company; Pacific Gas and Electric Company; and Interstate Transmission Associates (Arctic).

The high-pressure underground pipeline would measure 42 inches at its start and gradually decrease to 24 inches as gas is delivered for home and industrial uses.

The proposed route crosses approximately 1,900 miles of forest, 1,500 miles of cropland, 1,200 miles of grassland, 800 miles of tundra, and



The proposed natural gas pipeline would run from Alaska to three points in the United States. Its construction would be similar to that of the oil pipeline now underway.

100 miles of desert and chaparral.

Most of this land is privately owned. Of the 3,122 miles proposed through the United States, only 406 miles are on federal land.

The environmental impact statement was prepared by the Alaska Natural Gas Transportation System Project Environmental Impact Statement Task Force, U.S. Department of the Interior (USDI).

Task force members included representatives from nine agencies: Soil Conservation Service and Forest Service (USDA); Geological Survey, Fish and Wildlife Service, National Park Service, and the Bureau of Land Management, Reclamation, Outdoor Recreation, and Mines (USDI).

The study results will influence the pipeline route and assist in identifying measures to lessen harmful effects on the environment. The proposed time schedule requires a project recommendation by the Federal Power Commission to the President by spring, and the Presi-

Severity of the long-term impact of pipeline construction also depends on whether the topsoil is preserved.

dent to make a decision by the latter half of 1977.

SCS's role on the task force included furnishing technical information and identifying impacts to soils, vegetation, land use, and ecological factors along the route. Ellis F. Sedgley, SCS state resource conservationist in Denver, Colorado, coordinated SCS efforts and served on the task force.

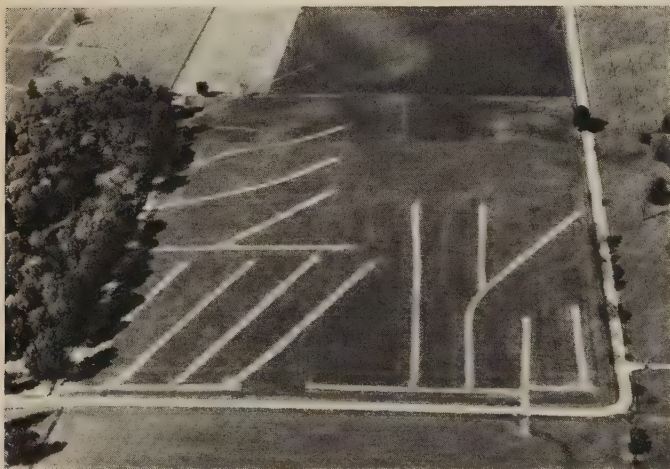
Some 70 employees from all levels of SCS furnished resource data and interpretations and identified potential environmental impacts. The task force also used soil surveys, state soil association maps, range site descriptions, and the SCS publication "Land Resource Regions and Major Land Resource Areas of the United States," which describes the environmental setting of the U.S. portion of the proposed project.

The coordination of soils information for the proposed route through Canada was done by John E. McClelland and Kenneth T. Ackerson of the SCS soil survey staff in Washington, D.C.

Of special interest is the potential impact on crops, farm drainage systems, and soils.

For instance, during construction of the pipeline, \$3 million worth of crops along a 1,600-mile Montana-Pennsylvania route could be destroyed. Estimated losses on the 14,500 acres of cropland during construction are 472,000 bushels of corn, 80,000 bushels of soybeans, 88,000 bushels of small grains, and 5,300 tons of hay.

Disruption of farm drainage systems from North Dakota to Pennsylvania also was studied. Tile drainage systems in the Midwest are typically



Farm drainage systems would be particularly susceptible to disruption from the proposed pipeline project. Tile drainage systems in the Midwest, such as this newly installed one on an Ohio farm, are typically 3 to 4½ feet deep. To maintain gravity flow through the tile line, the pipeline trench would need to be 10 feet deep rather than the more common 7 feet.



The high-pressure pipeline would measure 42 inches at its start in Alaska and gradually decrease to 24 inches as gas is delivered for home and industrial uses.

3 to 4½ feet deep. For gravity flow through the tile line to be maintained, the pipeline trench would need to be 10 feet deep rather than the more common 7 feet.

Heavy construction equipment could crush shallow tile lines, which would then have to be replaced so wet spots would not develop and cause lowered crop production and poor farming conditions.

Severity of the long-term impact of pipeline construction also depends on whether the topsoil is preserved. The applicants for the route have stated that topsoil would be stockpiled and returned to the surface of the trench only in certain areas where stipulated by the landowners.

It would be the responsibility of the individual landowner, when negotiating with the pipeline company on the right-of-way easement, to determine what mitigating measures should be applied on his property.

Stockpiling requires two passes by a trenching machine—the first to dig the topsoil and pile it to the

The adverse effects associated with the pipeline construction will be carefully weighed against the nation's need for energy independence.

side; the second to dig through the subsoil.

Single trenching mixes topsoil with generally adverse subsoils and prevents full restoration of the production potential of the land. The reestablishment and growth of plants under these circumstances can be extremely slow.

Other agricultural impacts of the proposed pipeline include:

- accelerated wind and water erosion on the exposed 84,000-acre right-of-way.

- increased downstream sedimentation.

- reduction of the esthetic quality of the landscape by removal or disruption of existing plant communities. In the case of forest land the companies propose preventing tree regrowth, because it would interfere

with the operation and maintenance of the pipeline.

- potential disruption of irrigation water delivery systems where the proposed pipeline crosses irrigation canals in Idaho, Montana, and North Dakota.

- the disposal of excess rock and soil displaced by the pipe.

The adverse effects associated with the pipeline construction will be carefully weighed against the nation's need for energy independence. This study will help insure that all beneficial and adverse effects are known before the decision to construct the pipeline is made.

Mr. Hansen is an SCS resource conservationist, plant sciences staff, Denver, Colorado.



Severity of the long-term impact of pipeline construction depends on whether the topsoil is preserved. If it is mixed with subsoils, revegetation could be extremely slow.



Another impact of construction is the disposal of displaced rock and soil. As with the oil pipeline, vibrating compactors would be used to pack fill material around the line.

Putting a Village on the Map

by Jeffrey Loser

A "new" village opened this Bicentennial year near the Pennsylvania Turnpike. Its mission: to revitalize the economy and heritage of Bedford County. Behind the scenes, the community worked to provide research, furnishings, and financing for the colonial village.



With the opening of Bedford Historic Village in south-central Pennsylvania on July 4, 1976, local residents achieved a threefold purpose to boost colonial history, native crafts, and employment.

In its first season, the village attracted more than 20,000 visitors, staged numerous craft demonstrations, and provided jobs in a county where the unemployment rate has been 15 to 20 percent.

It has been a community project from the beginning. Local historians did the research, local groups and individuals provided information and artifacts, the County Redevelopment Authority bought the land, and residents raised \$35,000 to help fund it.

Additional financial support has come from the Bedford County commissioners, the Pennsylvania Department of Commerce, the U.S. Department of Commerce's Economic Development Administration, and the Federal Comprehensive Employment Training Act (CETA).

More than 60 unemployed persons were hired through federal programs. They moved 12 historic buildings in the county to the village, including a barn and two schoolhouses. Projected employment for the 72-acre village when completed is 200 persons.

The Soil Conservation Service,

With many donations from the community, Bedford Village opened July 4 with a long-rifle salute.



through the Bedford County Conservation District, provided vegetative and soils information for the site. The village is a cooperator with the district.

In addition, SCS provided technical assistance to engineering students, hired through CETA, who laid out the pond and watercourses in the village.

As winter comes, workers will switch from outdoor to inside work. Plans for the village include a grist mill, log church, outdoor theater, 20 more houses, and eventually, an operating farm.

There is seemingly no end to the history the village can unfold. Within the county—which once covered most of western Pennsylvania—is Fort Bedford, one of the farthest forts west at one time; Forbes Trail, an old Indian route used by settlers and armies; and many 18th and 19th century homes and churches to research. One local historian has written eight volumes on the area.

For Bedford, the opening of the village marks also the beginning of revitalization of the county's economy and heritage.

Mr. Loser is SCS district conservationist, Bedford, Pennsylvania.



Lessons on Location

by Thomas W. Badger

There are a number of lessons to be learned at an historic and scenic site in the southeast corner of Kansas, and teachers, administrators, and students are out to incorporate them into their new outdoor learning center.

Fort Baxter . . . Quantrill's raid . . . the first cow town in Kansas.

All were once on the site of a new high school in southeastern Kansas, and faculty and students are taking full advantage of the location.

They've established an outdoor learning center on the year-old, 40-acre campus of the Baxter Springs Unified School District. And, as its program grows, the center will help bring the area's heritage to life with history and sociology lessons that are taught "on the spot."

The new center already is being used for photography, radio and television production, geology, and other subjects. Center study areas include a geology wall, upland and riparian woodlands, cropland, a river, and an oak forest.

Walkways soon will be built to the river for studies on water quality, and native vegetation for wildlife food and cover will be planted on the campus to round out the natural resource study areas.

Officials enlisted help to develop an outdoor learning center early in the school's planning. Their conservation plan was developed with assistance from the Cherokee County Conservation District, which now sponsors workshops to acquaint

teachers with the learning center's potential.

The center also received assistance from the See-Kan Resource Conservation and Development (RC&D) Council. One RC&D measure resulted in a natural resource inventory by the Extension Service and the Soil Conservation Service.

The inventory identified trees, grasses, and other resources unique to the area, including 25 plant species found nowhere else in the state.

Another RC&D measure is stabilization of eroding areas at the center, including revegetation and improved drainage on steep slopes.

The center, near the Missouri Ozarks, isn't only for the benefit of the district's 900 elementary and high school students.

An adjoining school district has been invited to use the area . . . plans are underway for recreational facilities for the public . . . and a special invitation is going out to senior citizens to enjoy the outdoors at this historic and scenic learning center.

Mr. Badger, SCS district conservationist, Holton, Kansas, was formerly SCS district conservationist, Columbus, Kansas.

Keep on Trackin'



by Doris Laber

Bogged down with a wet track, students and teachers at a Maine high school picked up shovels—and knowledge—as they put in a tile line with the help of a soil and water conservation district, school officials, and an RC&D council.

Away.
Away.
Away.

That's how the track and field schedule for Medomak Valley High School in Waldoboro, Maine, has read every spring since the school opened in 1968. All meets have been held away.

"It's been an unbearable situation," Athletic Coach Arthur Dyer declared. "During most springs it has been so wet that a person walking on the track would leave footprints 2 to 4 inches deep.

The 100 boys and girls on teams had to compete—and even practice—on opponents' fields or neutral grounds. The entire student body was limited to indoor physical education classes each spring.

A remedy was found through student and teacher involvement in a special project of the Time and Tide Resource Conservation and Development (RC&D) area.

School officials found that the field drainage problem met the requirements for an RC&D measure. This could provide funds for the engineering design and materials.

The local sponsors—the Knox-Lincoln Soil and Water Conservation District (SWCD) and the school administrative district—would have to pay for labor and equipment, estimated at \$4,000.

That left the project on the verge of bogging down as thoroughly as anyone who dared to venture out on the track.

Then Medomak students decided to pitch in and work for what they wanted. Their labors—in a learning situation—became the answer to the budget problems.

Under a detailed plan, 40 forestry and conservation students were released from classes for a week to prepare the area for backhoe work. Their teacher, Douglas Meservey, led the project. Meservey, a supervisor of the Knox-Lincoln SWCD, spent a week onsite with the students. He also was on call for assistance needed by other teachers supervising the job.

The athletic director and coaches were freed from regular duties to assist when needed. Other classroom teachers supplemented the team.

SWCD technician Raynold Holmes

served as project director to see that the drainage system was installed according to specifications. He was "the thread of continuity for the program," said Meservey.

After lessons from Holmes in using a level, the students set grade stakes for the backhoe operator to follow.

Because of earlier work by students, they had use of a backhoe and operator at no charge. Students in building trades classes had built a storage shed for the town, so the town loaned them the equipment—the only heavy equipment used in the project besides gravel trucks.

After the trench was dug with the backhoe, students shaped the trench bottom to a grade of 1½ inches per 100 feet. They wielded shovels, spades, and wheelbarrows and carefully put gravel under and over 3,400 feet of tile.

"The students were very conscientious," Meservey said. "Some areas were done and redone to get the job right."

The work was completed in the "dry" season. Even then, students figured that the completed system was draining off water at the rate of



Students got lessons in surveying and laying tile with help from SWCD technician Raynold Holmes (above).

5 gallons every 4 minutes—enough to fill more than five railroad tank cars in a month.

The track is now resurfaced with finely crushed stone and the disturbed areas have been reseeded.

Improvements are not limited to the track. The school plans to set up sites for javelin, shotput, high jump, and broad jump in the infield and in nearby areas outside the track. Also, some of the soil displaced by the tile line has been used to fill potholes in the soccer and baseball fields.

Not the least of the improvements is that considerably less mud should be tracked into the school. "And that makes for good relations between maintenance and administrative people," said Dyer with a grin.

Come spring, the teams expect to play a full schedule, with 4 weeks added to their spring sports season.

And, at last, the programs will be listing games at "Home."

Ms. Laber is SCS public information officer, Orono, Maine.

Keep It Clean

by William Branigan

In Pennsylvania, a dairy farmer and conservation district chairman has devised a ramp to allow his cows to drink from a stream . . . yet keep it clean.

The dairy cows of John Vanderstappen take a well-thought-out step before they drink water from his stream.

Vanderstappen did the thinking . . . and building.

He designed and built a ramp to the stream that allows the cows to drink but not pollute the water. An electric fence and curb prevent them from entering the stream. The ramp is just wide enough for two cows to drink at a time but not to turn around and contaminate the water. They have to back out.

Vanderstappen designed the ramp, made of railroad ties, several years ago. He built one in each of his four pastures.

"Clean water is the most valuable resource I have for milk production," explains Vanderstappen, newly elected chairman of the board of directors of the Crawford Conservation District in northwestern Pennsylvania.

A native of Holland, where he first became conscious of water quality problems, Vanderstappen came to the United States in the 1950's, worked at a nursery, and then began farming. He has been a cooperator with conservation districts in Pennsylvania since 1964.

His emphasis on the quality of natural resources extends far beyond designing his ramp. He has made

many improvements on his farm based on a knowledge of his soils. He maintains production—and conservation—through a crop rotation system of corn, oats, and hay; a four-pasture rotation system; and a tile drainage system. He has dug open drains to improve pasture and cropland and put in grassed waterways to control erosion.

He didn't learn all this the easy way, but he's a man who will have a washout only once.

One of those "learning experiences" came shortly after Vanderstappen bought his present farm. It had a pond with a grassed waterway leading into it. Vanderstappen plowed out that grassed waterway for crops.

"Then a big rain came," Vanderstappen says. "It took out all that plowed ground and put it in the pond."

That anecdote is one Vanderstappen is not hesitant to tell as he explains the need for conservation practices on the land.

He now can give it a happy ending. This year, he drained the pond to remove the sediment. The pond will be refilled—but this time, not with soil. Vanderstappen has learned the value of grassed waterways.

Mr. Branigan is SCS district conservationist, Meadville, Pennsylvania.



The following is a condensation of remarks by Glen E. Murray, State Conservationist, Kentucky, at the annual SCS State Conservationists Meeting, Kansas City, Missouri, in September 1976. Coauthor of the paper is Gerry R. Lowry, Environmental Services Division, SCS, Washington, D.C.

SCS and Water Quality: An Overview

Despite the long involvement of SCS in river basin, watershed, and other water-related activities, our agency's primary orientation is toward land conservation and development. Our interest in water quality has been stimulated by P.L. 92-500, the Federal Water Pollution Control Act Amendments of 1972. We now have national goals for clean water. Nonpoint sources of water pollution increasingly will be targets for corrective action. In light of the inseparable land and water aspects of a program to control nonpoint pollution, SCS has no choice but to become involved.

Nonpoint source pollutants include many things, but eroded soil and materials carried with the soil are primary targets. A disturbing projection, made by the Environmental Protection Agency's Mark Pisano in a recent *Journal of Soil and Water Conservation* article, is that 90 percent of all suspended solids contributed to the nation's waterways will originate from nonpoint sources after the 1977 point source goals are achieved. He also states that 79 percent of the nitrogen, 53 percent of the phosphorus, and 98 percent of the coliform bacteria will originate from nonpoint sources.

Water Quality

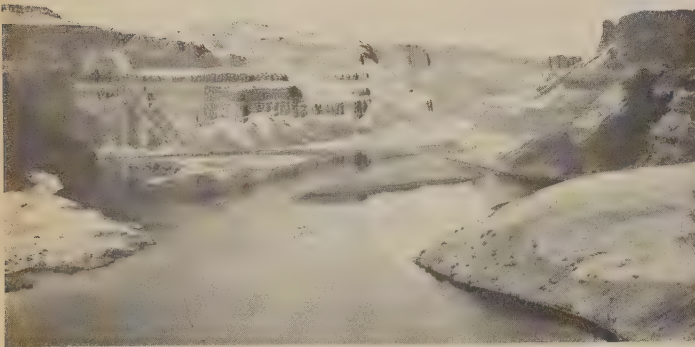
Water quality is the physical, chemical, and biological condition of water in relation to its beneficial use. Good water quality is a condition to permit or facilitate a desired land or water use. For example, water quality can be good for fishing but bad for drinking. Waste assimilation and transport also are legitimate uses for water, along with such other uses as fish production, navigation, irrigation, and esthetic enjoyment.

From a rural land user's viewpoint, the factors that contribute most to upstream water quality problems are:

1. Sediment from eroding lands;
2. Dissolved nutrients from erosion, runoff, and leaching;
3. Exotic chemicals and heavy metals, dissolved or linked to sediment;
4. Dissolved salts from irrigated or leached lands; and
5. Pathogens and various oxygen-demanding substances from animal wastes.

Manure from midwestern feedlot pours into stream after 2-day spring rain and snowmelt. Solution is animal waste lagoon or prompt collection of manure and subsoil application in fields.

Silt bar in estuary at mouth of Washington's Palouse River is part of 1.3 million tons of silt deposited there annually from rolling croplands above river.



Not all "nonpoint source pollution" results from man's activities. Sediment from South Dakota's Badlands was getting into rivers long before man came along.



Death of a Lake. Excessive sedimentation of lakes and rivers is not a new concern of SCS and conservation districts. In 1926 (top), Lake Como near Hokah, Minnesota, attracted hundreds of visitors each summer. By 1936 (bottom), the once beautiful lake was silted in, but for a small run trickling through the center. By this time, "wagonloads of dead fish had been carted off." Cause of death: farmers clearing timber from steep upland slopes, then plowing up and down hill for crops. Three valleys contributed the silt.

Nonpoint Sources

Nonpoint sources are the areas of land from which these substances originate. Most nonpoint source loads occur in the form of eroded soil. Sediment is not the whole story, however. Nitrogen, certain other chemicals, and dissolved salts traveling directly in water also distinguish between natural background loads of sediment and culturally increased loads. Before this country was settled—even by Indians—significant quantities of what 20th century man calls "nonpoint pollutants" were entering rivers and lakes. Sources include the Great Lakes shoreline, the Grand Canyon and Badlands, and young, raw streambanks. Some of the confusion about water-quality goals is related to a failure to recognize this natural background load—which in most cases has not been very well identified or quantified.

"Culturally induced loadings" are the increased volume of pollutants caused by man's activity. Until a point is reached where this increased load jeopardizes a desired beneficial use, there is technically no pollution.

Nonpoint source pollutants are not easily defined and come from diffuse areas. About the only practical way to approach control of the problem is to place standards on use and care of source areas and land use activities. Thus, the land-oriented conservation approach of SCS and the districts has been and is a nonpoint source water-quality program.

New Formula

One way to relate land use to water quality would be to devise a universal water contribution formula to complement the universal soil loss equation. Such a formula could predict the contribution of soil, nutrients, and other potential pollutants to receiving surface waters. From such a position, it would then be an easy step to a philosophy of using each acre of land so that its yield of nonpoint pollutants is within acceptable limits. Eventually, under P.L. 92-500, "acceptable" is going to be determined through the establishment of best management practices on the

land. Again, our attention is directed back to the land.

We also need to clearly reflect water-quality needs when we discuss alternative combinations of practices. Using this same approach, we could develop the best combination of practices needed to meet water-quality standards in a particular watershed. This is really not that much different from what we have been doing; it is merely an expansion of our planning concept to account for the effect of land use and treatment on water.

Past Efforts

Excessive erosion and sediment have been central concerns of SCS and districts since our beginning. In 1938 it was noted that the bed of the Rio Grande River in central

New Mexico had risen 5 feet in 9 years. The Arkansas River in western Kansas had risen 5 feet during the previous 45 years. Four reservoirs on the New River in Virginia had lost from 23 to 83 percent of their capacity due to sediment in periods varying from 6 to 33 years. Similar reports were common from every section of the country.

We all are familiar with past efforts to get at this problem. The search for the best way to get practices on the land produced the conservation district institutional framework.

In 1955 and 1964, respectively, the watershed and RC&D approaches to resolving conservation problems over wide areas were implemented.

Within watershed projects alone, land users are estimated to be reducing erosion by more than 50 million

tons annually through conservation measures on their lands. About 24 million tons of sediment have been trapped in reservoirs to prevent further damage downstream. More than 900 critical area treatment measures have been planned by local governments through the RC&D program. Watershed projects, however, cover only 3 percent of the United States, and 50 million tons of sediment is only about 1 percent of the annual discharge of sediment to our nation's streams.

Current Picture

Today, the public is coming to recognize water pollution and to learn that sediment is a major consideration in all uses of water and is still the largest single pollutant by volume. About 4 billion tons



A well-protected watershed prevents sedimentation as well as soil erosion. Soil in Minnesota's West Willow Creek watershed is kept in place with contour stripcropping, terraces, diversions, and grassed waterways.

“Even during the 43 years of the Soil Conservation Service, Americans have not used the land as well as they know how . . .”

of sediment reach our streams each year. The U.S. Geological Survey estimates that nearly one-half billion tons are discharged to the oceans annually, while another estimate is that 1.3 billion tons are trapped in reservoirs. Despite many efforts to study sediment, there has been no overall evaluation of its social and environmental cost.

Around 30 percent of today's sediment is natural background from geologic erosion. About 50 percent of sediment comes from agricultural land. Another 10 percent comes from range and forest lands, and the remaining 10 percent from eroding roadsides, construction activities, surface-mined lands, and other disturbed areas. About 70 percent of the total, theoretically, is subject to control at its source through soil and water conservation efforts. Our water-quality goals under P.L. 92-500 can never be met without a program to control a substantial portion of this sediment. This should then answer the question of whether a rural upstream water-quality program is needed.

We must recognize that to become actively involved in controlling sediment is a massive undertaking and job. No program or regulation can reach every acre. Even under the best land use and conservation systems, we know some soil will be lost. The key lies in reaching those acres where erosion is most critical. Conservation programs are needed on selected lands, to control selected erosion-causing activities.

Key Factors

The best conservation program in the world is no good if it remains on paper and is not put on the ground. Even during the 43 years of the Soil Conservation Service, Americans have not used the land as well as they know how; the same will probably be true with water-

quality practices. If we are going to encourage others to participate in water-quality planning and application, the incentive system may well be a key factor for long-term success.

Voluntarism has been the leading edge of the system of incentives causing people to practice proper land use. This system has enjoyed remarkable success through conservation districts.

Economic incentives, or “the carrot,” have been reasonably successful in the form of programs like ACP and REAP in stimulating practice application. The carrot has been a dismal failure, however, in lesser developed countries. Even in the United States, economic incentives will never be more than part of the picture due to the anticipated steep rise in the cost of achieving nonpoint source control.

The third primary incentive for proper land use in this country is law or regulation. Use of this device appears to be growing rapidly, particularly at the state level. Faced with a need to get a handle on air, water, and land pollution control within a short time, it is only natural that states have turned to regulation. Direct regulation, such as 404 permit systems, Iowa erosion control programs, and New York and Pennsylvania's permit and planning requirements, appears to be the “nonpoint wave of the future.” Fifteen states have erosion and sediment control legislation.

In relation to water quality, the question is, “What combination of incentives is best to get the job done and still preserve as much freedom of choice as possible?” I believe SCS should take a strong position—advocating a mix of incentives containing about 10 parts voluntarism, five parts economic, and one part legal. The strong voluntarism approach is the conservation district program—the message here is stay

with districts. This is still the soundest and most democratic long-term solution to land and water-quality problems.

Summary

- There is a persistent and important water-quality problem in rural America.
 - SCS and conservation districts are uniquely well suited to lead the attack on these water-quality problems. We have key roles—even if they are different.
 - The conservation plan provides a basic mechanism for attacking the nonpoint problem.
 - We have a strong history in land use and management and this is precisely where water-quality problems originate. We need to expand conceptually and technically to account for water-quality effects. Some further changes are needed in organization, in the mix of our expertise, in technical methods, and in programs. We need to do this carefully and with a great deal of thought.
 - Getting the proper mix of incentives is a key problem in water quality.
 - Regulations will likely be a more widely used incentive.
-

Erosion and Sediment in the West

by John D. Hedlund

In a study in the 11 western states, SCS looks into the amount of erosion and sediment occurring and what might be done about it.



What's the status of erosion in the West today . . . and what can be done about it?

That's the subject of a study by the Soil Conservation Service which has resulted in a 152-page report on "Erosion, Sediment, and Related Salt Problems and Treatment Opportunities."

Nearly 100 million acres—or 15 percent of the land in the 11 western states—have an average annual sediment yield greater than 0.5 acre-feet* per square mile, the rate at which serious erosion was assumed for this study.

Most of the severely eroding land is in five states—Arizona, California, Montana, New Mexico, and Utah. California alone has 21 million acres that are severely eroding.

The most extensively eroded cropland in the western states is the 8.4-million-acre wheatland area of the Columbia Plateau in Washington, Oregon, and Idaho. This area, which includes the Palouse, has erosion rates that range up to 100 tons of soil loss per acre per year. In the Palouse, all the topsoil has been eroded from 10 percent of the land and 25 percent to 75 percent of the topsoil has been eroded from an additional 60 percent of the land.

The highest sediment yields per square mile of any river system in the United States are in northwestern California. This is due primarily to erosion from channels and landslides and from poor logging practices.

Total sediment yield in the West is estimated at 660 million tons each year. It accumulates in reservoirs and streams, increases flooding, decreases the capacity of irrigation and drainage systems, destroys crops, decreases the recreational value of water, and adversely affects fishery resources.

Erosion is also a major contributor to the 90 to 100 million tons of salt

going into western surface waters each year.

Much of the sediment in western streams is the result of geologic and streambank erosion for which there are few economically feasible conservation solutions. On some watersheds, more than 50 percent of the sediment is from gully, channel, and streambank erosion.

The study, based on field reports from SCS offices in the 11 western states, indicates sediment yield could be reduced by an average of 15 percent if treatment measures to control erosion were installed on 394 million acres and 107,000 miles of stream channels in the West. In some states, as much as 43 percent of the sediment could be prevented. The estimated average annual cost of such a program is in 1970 dollars \$531 million a year.

The measures include land treatment and management, such as rangeland seeding and brush control, and land use changes on 6 million acres, including switching from row crops to a permanent cover crop. In some areas and taking some fragile rangeland out of grazing use.

These erosion control improvements would also result in a salt load reduction of more than 2 million tons per year. In addition, improved irrigation methods to decrease salt accumulations in return flows are needed.

In a breakdown by state, the SCS report shows:

Arizona

Of its 73 million acres, Arizona has 390,000 acres with severe erosion problems. Much of the erosion occurs in the upper watersheds and then affects irrigation downstream. Water diverted from the Gila River, for instance, is heavily laden with sediment from the San Pedro River.

an average dry weight of 85 pounds per cubic foot, then 1 acre-foot weighs 1,851 tons. On the other hand, an acre-foot of sediment that weighs 60 pounds per cubic foot (dry) in a reservoir would be equivalent to 1,307 tons.

The deposition of these sediments decreases the capacity of canals, ditches, and reservoirs and decreases the rate of water intake into irrigated soils. Another problem is the sharp increase in salt concentration occurring on the Colorado River at the Mexican border. The Wellton-Mohawk Drainage Canal discharges 1 million tons of salt annually into the Colorado River system in irrigation return flows. An interagency program, in which SCS is participating, is underway to minimize the effects of salt loading. Improved onfarm irrigation management is needed to reduce salt loading and should be carried out in conjunction with an erosion control program.

California

About 80 percent of the high sediment yield areas in the state are on streams draining the north-, central-, and south-coastal areas. The Eel and Mad River watersheds are sources of high sediment yields: the Eel River has the highest reported average annual sediment yield per square mile of any stream of comparable size in the United States. Channel erosion, landslides, and poor logging practices are the primary sources of sediment. In many areas only 10 to 15 percent of the sediment comes from sheet and rill erosion on the watershed. About 20 percent of the streambanks in the state have moderate to serious channel erosion. The San Joaquin watershed of 13,540 square miles has an average annual salt load of 412 tons per square mile, which is the highest recorded for a large watershed in the United States. A treatment program on 3 million acres to reduce soil salts and to improve irrigation practices and on 8,200 bank miles of channel to control erosion in the state could reduce annual sediment yield 5 percent and salt load 1.5 million tons.

Colorado

Serious erosion, sediment, and salt-loading problems exist in the semiarid shale badlands or shale-derived alluvium in western Colorado and in the Arkansas Valley of

* Conversions between acre-feet and tons can only be made when an average dry weight of the soil is known or assumed. Then, to get the tons per acre-foot, the conversion factor is 21.78 multiplied by the pounds per cubic foot. For example, if an upland soil has

With no streambank protection, this wash on a farm in Arizona carries floodwater and sediment to the Gila River.



Improved onfarm Irrigation management is needed to reduce salt loading and erosion damage.



A gully, caused by uncontrolled irrigation water, continues to carve a path through deep loess soil in Wyoming.

Much of the sediment in western streams is the result of geologic and streambank erosion for which there are few economically feasible conservation solutions.

eastern Colorado. Serious erosion and the resulting high sediment and salt yields pollute waters of the mainstem of the Colorado, Gunnison, Dolores, and San Juan Rivers in western Colorado. In eastern Colorado serious erosion occurs mostly in alluvial valleys along the foothills in Las Animas, Huerfano, and Pueblo Counties where it has been accelerated by such past activities as coal mining and overgrazing. Treatment needed to reduce sediment and salt includes changes in land use on 24 million acres, improved management on 12 million acres, land treatment and management on 9 million acres, and 3,300 miles of channel improvement. If these practices are installed they could reduce sediment yield 21 percent and reduce salt loading associated with erosion by 90,000 tons annually.

Idaho

Serious land and water quality problems exist in Idaho because of channel and sheet erosion on 600,000 acres which have an annual erosion rate over 10 tons per acre. This erosion rate is too high to protect the productivity of the land. The largest areas of soil loss occur in the deep loess soils of the Palouse area, the areas near the Snake River plain, and on the Bear River watershed in southeastern Idaho. Some of the most severe erosion occurs in the watersheds of Rock, Hangman, and Cow Creeks and the Coeur d'Alene, Palouse, Potlatch, and Clearwater Rivers. Streambank erosion has caused land and property damages on the Raft, Teton, Big Lost, and Salmon Rivers and in some areas of Kootenai, Benewah, Latah, Nez Perce, Lewis, Idaho, and Shoshone Counties. SCS has made a recent study of impacts due to erosion and sediment control measures in Idaho. A substantial reduction in sediment delivered to the streams

is possible. Practices, programs, and technical expertise are available to accomplish this reduction if they are applied.

Montana

Severe erosion, sediment, and salt problems are localized and occur mostly in eastern and central Montana. Geologic erosion of barren or nearly barren outcrop areas of Pierre and Bearpaw Marine Shale Formations produces large amounts of sediment and salt. Nearly 10,000 square miles have extensive areas of salt-affected soils which also contribute to salt loading of streams in eastern Montana. Opportunities to reduce erosion, sediment, and salt loading in Montana include changes in land use to provide increased ground cover on nearly a million acres, improved management on 15 million acres, land treatment and management on 37 million acres, and channel improvement on 6,000 miles. The average annual cost of the treatment program is estimated at \$62 million and would result in a 33 percent reduction in annual sediment yield.

Nevada

Statewide, Nevada sediment yield is the lowest in the West, due to its arid climate. Serious erosion, sediment, and salt loading problems exist in the Muddy, Virgin, and Meadow Valley Wash watersheds, which are tributaries to the Lower Colorado River. Severe channel erosion occurs along tributaries of the Lower Colorado River, the Truckee River where it discharges into Pyramid Lake, and on several tributaries of the Humboldt River. Because of the state's arid and semi-arid environment the primary treatment program to reduce erosion and enhance water quality has been identified as improved land management on 53 million acres.

New Mexico

New Mexico finds itself in the undesirable position of having the highest average annual sediment yield rate of any state in the West. Serious erosion and related sediment and salt problems exist over most of the state. High salt loading of streams from nonpoint sources correlates with the higher sediment yield areas. About 11,000 square miles have saline soils, and about 12,000 square miles have high annual sediment yields. Of the 112,700 miles of stream channel in the state, 40,000 miles have serious or moderate streambank erosion. In many watersheds, 70 to 90 percent of sediment yield is from gully and channel erosion while only 10 to 30 percent is from sheet and rill erosion. The Pecos River, the Rio Grande, and their tributaries carry a high sediment and salt load in their runoff. This significantly increases the cost of water use and reduces its utility.

Oregon

Critical erosion and sediment loading problems exist in south coastal areas, particularly in areas of heavy timber cut on unstable soils. On the Sixes River watershed in southwest Oregon, where at least 80 percent of the watershed has been harvested over a period of years, sediment yield rates average 2 acre-feet per square mile. The soils in the area are generally unstable, and as many as 25 landslides per quarter mile have been observed along road cuts. High sediment yields also occur on the loess soils in the Umatilla watershed and the granitic soils along the Wallowa Mountains which have little or no vegetative cover. Serious and moderate channel erosion occurs on nearly 14,000 miles of streams in the state and is frequently accompanied by local landslides and overflow. Through changes in land use, improved management, land treatment, and channel stabilization and protection, sediment yield could be reduced by 43 percent.

Utah

Channel, gully, and sheet erosion of the numerous gypsiferous deposits,



Total sediment yield in the West is estimated at 660 million tons each year, accumulating to increase flooding and decrease productivity of the land.

marine shales, and halite outcrops have a major effect on the quality of runoff water in the state. Bryce Canyon, Cedar Breaks, Zion, Capital Reef, Arches, and Rainbow Bridge are national parks or monuments which have high erosion rates; however, this is geologic erosion and adds to the scenic beauty of the area. Land treatment measures and management are not generally economically feasible in areas with high geologic erosion; therefore, most of Utah's sediment and salt reduction will occur on areas of moderate erosion and salt yield. In some reservoirs, annual sediment deposition displaces enough water to irrigate a 250-acre farm. SCS estimates that sediment yield could be reduced 13 percent and annual salt loading could be reduced 300,000 tons if a treatment program including change in land use on 1 million acres, improved management on 25 million acres, management coupled with structural and land measures on 6 million acres, and channel improvement on 33,000 streambank miles were implemented.

Washington

Severe erosion and sediment source areas in the Columbia Plateau exist on 5.7 million acres of nonirrigated grainlands in 13 counties. About 2.1 million acres of dry cropland have average annual sheet and rill erosion rates of 6 to 12 tons per acre, and 760,000 acres of irrigated cropland have annual erosion rates of 6 to 12 tons per acre. Soil losses through erosion on dry cropland during some years can be 25 to 150 tons per acre in the Palouse. Sediment deposition results in increased flooding, accumulation in reservoirs, damage to irrigated lands, a decrease in the recreational value of water, and adverse effects to the fishery resources of the Columbia River. A reduction in sediment yield of 75 percent is possible in critically eroding areas with land treatment, supplemental structures, and conversion of steeper slopes to grassland. Change in land use is difficult to achieve when demand for food production is high and economic return from wheat is well in excess of production costs.

Wyoming

Severe erosion, sediment, and salt loading problems exist in the semi-arid basins where saline soils are found. These soils erode readily, and in the process salts are dissolved and carried with the sediment into the streams. Degradation of water quality exists in large watersheds, including Powder, Wind-Bighorn, North Platte, and Green River Basins. Gully erosion accounts for more than 50 percent of sediment yield in these basins. Sediment loading can be reduced 22 percent if a treatment program is implemented including improved management on 47 million acres, mechanical land treatment on 9 million acres, and channel stabilization on 10,000 streambank miles.

Mr. Hedlund, formerly SCS hydraulic engineer, Special Projects Division, Golden, Colorado, is SCS soil conservationist, West Technical Service Center, Portland, Oregon.

Helping Hands

by Charles R. Adams

On a 6-acre plot at the Abilene State School in Texas, mentally retarded students are harvesting seeds by hand to produce benefits for wildlife and livestock around the state. At the same time, they are receiving the benefits of therapy and horticultural training.

The project got underway last spring as a cooperative venture by the Middle Clear Fork Soil and Water Conservation District, the Soil Conservation Service, and the school, one of several Texas centers for the training, development, and rehabilitation of the mentally handicapped.

The SCS plant materials center at Knox City, Texas, provides forbs and shrubs for which mechanical harvesting is not possible. Most of the plants were once abundant in Texas but have been nearly wiped out by overgrazing. The plant materials center is using the new seed stock for test trials to reestablish the plants on native range.

Shrubs grown at the center include littleleaf leadtree, smallflower peach-bush, and Wright's anisacanth, all used for livestock grazing and wildlife browsing. The students also harvest seed from such forbs as skeletonleaf goldeneye, englemann daisy, prostrate bundleflower, and least snoutbean.

SCS provides technical assistance for planting, cultivating, irrigating, and harvesting. The agency earlier prepared an inventory and evaluation of soil and water resources at the school and designed a drip irrigation system for the plot.

The school, the conservation district, and SCS will review results of the project each year to see that it continues to provide training and therapy for the students and native plant seedlings for Texas rangelands.

Mr. Adams, formerly SCS soil conservationist in Abilene, is SCS district conservationist, Eastland, Texas.

Meetings:

November

- 18-22 Adult Education Association of the U.S.A., New York, N.Y.
- 24-27 National Council for Geographic Education, San Francisco, Calif.
- 28-30 American Society of Farm Managers and Rural Appraisers, St. Louis, Mo.
- 28-
Dec. 1 World Wildlife Fund Fourth International Congress, San Francisco, Calif.
- 28-
Dec. 2 American Institute of Chemical Engineers, Chicago, Ill.
- 28-
Dec. 3 American Society of Agronomy, Crops Science Society of America, and Soil Science Society of America Joint Annual Meeting, Houston, Tex.
- 30-
Dec. 3 Western Forestry Conference, Portland, Oreg.

December

- 1 Annual Meeting and Awards Banquet, Keep America Beautiful, Inc., New York, N.Y.
- 2-3 National Association of Manufacturers, New York, N.Y.
- 6-10 American Geophysical Union, San Francisco, Calif.
- 7-9 American Seed Trade Association, Inc., Sorghum Research Conference, Chicago, Ill.
- 8-9 American Forest Institute, San Francisco, Calif.
- 9-10 American Seed Trade Association, Inc., Soybean Research Conference, Chicago, Ill.
- 10-17 International Symposium on Land Subsidence, Sponsored by International Association of Hydrological Sciences, Anaheim, Calif.
- 13 "Drainage for Increased Crop Production and a Quality Environment," Sponsored by American Society of Agronomy, Crops Science Society of America, and Soil Science Society of America, Chicago, Ill.

January

- 9-12 American Farm Bureau Federation, Honolulu, Hawaii
- 9-13 National Council of Farmer Cooperatives 48th Annual Meeting, San Juan, Puerto Rico
- 10-14 North American Game Breeders and Shooting Preserve Association National Convention, Milwaukee, Wisc.
- 16-19 National Wool Growers Association—National Lamb Feeders Association Convention, Monterey, Calif.
- 30-25 American National Cattlemen's Association Annual Convention & Trade Show, Atlanta, Ga.



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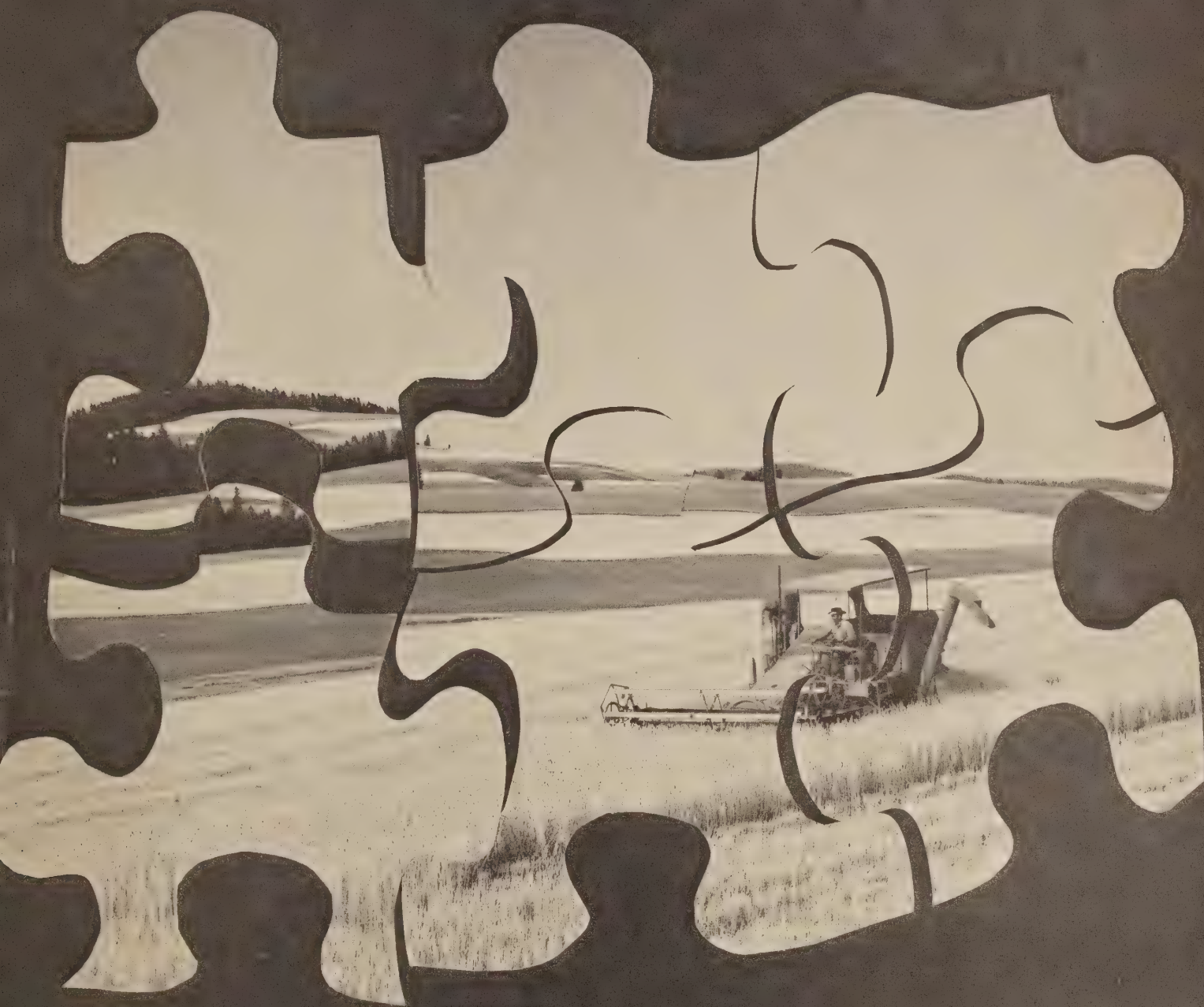
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Potential Cropland: Where the Pieces Lie

Demonstration Days

Recovering a River

Stewart
McBee
R
12
16



More Help for Minority Farmers

From the Administrator

The benefits of Soil Conservation Service programs are available to all people in conservation districts, without regard to race, color, religion, sex, or national origin.

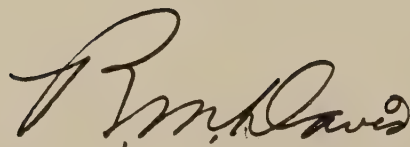
This is not a passive policy. SCS employees are charged with actively encouraging minority land users to become cooperators with their local districts, to attend conservation meetings, and to participate fully in district affairs.

One example of how this policy is transformed into action is in Tennessee, where SCS several years ago initiated a Group Action Program for rural development. Designed to reach minority families, the program enlists the help of USDA agency offices at the county level and rural development specialists at two state universities. Each local project begins with a well-advertised community meeting for minority land users. At the meeting, conservation needs and other problems are identified and discussed, and, at subsequent meetings, a group plan of action emerges. Individuals in each group sign up as cooperators of the local conservation district. So far, SCS has brought needed help to about 1,500 minority families in Tennessee through the Group Action Program.

Special efforts in Texas help make minority farmers and ranchers aware of SCS technical assistance. Public information efforts have included production of Spanish-language radio and TV announcements and publications geared to conservation needs around Spanish-speaking communities. Campaigns to recruit bilingual employees have enabled SCS to conduct Spanish-language conservation workshops and to provide effective onsite conservation planning help.

In several states, emphasis is given to opportunities for work with American Indians. In Oklahoma, the Cherokee Nation has received help on critical-area treatment efforts through the Cherokee Hills Resource Conservation and Development Area. In Washington, modern soil survey information has led to irrigation and drainage improvements in the 225,000-acre Yakima Indian Reservation Irrigated Area. In South Dakota, Cheyenne River Sioux operate their own ranches under Great Plains Conservation Program contracts.

These are a few examples of the kind of creative assistance that truly extends the benefits of soil conservation to more people. There are others—with these and other minority groups. We expect to see conservation aid extended even more in the months and years ahead.

A handwritten signature in dark ink, appearing to read "J. M. Davis". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

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John A. Knebel
Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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Cover:

**In a nationwide study, SCS identifies
111 million acres of land suitable for
conversion to cropland if needed . . .
and where they are in the 10 farm pro-
duction regions. See story on page 5.**

Soil Conservation

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"Very Little Time To Protect Our Precious Cropland Reserve"

The reserve of 111 million acres of potential cropland estimated by the Soil Conservation Service would seem to be enough to take care of the nation's needs for increased production for the foreseeable future.

But the same SCS study that provided the estimate shows a disturbing trend of loss of cropland to competing, more intensive uses. The 111-million-acre reserve will not be available for cropland for long.

The SCS potential cropland study shows that between 1967 and 1975, 2 million acres were urbanized each year in the United States. For every acre taken by urban development, at least 1 additional acre is leapfrogged and isolated, so that it, too, is no longer available for cropping. This adds up to 4 million acres a year going to urban uses. Another 1 million acres a year, according to the study, are converted to lakes, ponds, and reservoirs.

At this rate—5 million acres a year if present trends continue—we will develop 120 million acres between now and the year 2000. About a third of this total—36 to 40 million acres—will be taken from cropland. Replacing this cropland may require farming some low-yielding, erosive, wet, stony, shallow, and drouthy soils.

We are facing a squeeze in productive capability only a few years from now. We have very little time in which to build a protective fence around a previous potential cropland reserve or lose it for all time.

It is important to note that a significant part of this land is in Standard Metropolitan Statistical Areas (SMSA's). Seventeen percent of all United States farms are within SMSA's and these farms produce 21 percent of all agricultural products sold. Increasingly, however, this land is being converted to commercial, residential, and industrial uses. According to a recent Domestic Council report to Congress, in the 22 years between 1950 and 1972, 17 states lost more than 20 percent of their taxable farmland, 9 states more than 30 percent, 4 states more than 40 percent, and 2 states more than 50 percent.

Another aspect of this is the loss of the best agricultural land—prime farmland. About a year ago, the issue of prime farmland was reviewed and discussed in considerable detail at the Prime Land Seminar sponsored by the U.S. Department of Agriculture. One of the outgrowths of the seminar was renewed dedication by USDA to protect and preserve prime farmlands, as expressed in policy statements by the Secretary.

Prime farmland is like prime beef—it's the top grade, the best. It is land best suited for and available for producing food, feed, forage, fiber, and oilseed crops. Prime farmland consists of soils that have an adequate, dependable moisture supply, either from natural rainfall or irrigation; soils that are warm enough and have a long enough growing season for the crops otherwise adapted to the area; soils that are neither too acid nor too alkaline for good plant growth; soils that are permeable to water and air; soils that are not so stony as to interfere with cultivation with large machinery, and soils that are not highly erosive. Using land capability criteria, prime farmland corresponds closely to Classes I and II, with perhaps some areas of Class III soils. The Conservation Needs Inventory of 1967 shows a total of 334 million acres of Classes I and II in a billion and a half acres of nonfederal rural land that we sampled. Not all of that land, of course, is cropland, nor is all of the noncropland available for conversion to cropland.

According to our best judgment, almost all of the available prime farmland is being cropped in the United States. Of the estimated 111 million acres of potential cropland remaining, only 24 million acres qualify as prime farmland.

Adapted from paper presented by Mr. Johnson, deputy administrator for technical services, SCS, at the Combined Western Sectional Meetings of the American Society of Animal Science and Canadian Society of Animal Science, Washington State University, Pullman, Washington, July 20, 1976.

The potential cropland study completed by SCS this year provides not only information on the national level but also by farm production region. In the report, SCS notes changes in land use in the regions since 1967 as well as distribution of cropland reserves.

by Ray Dideriksen

Potential Cropland: A Regional View

About the Study . . .

SCS's potential cropland study was initiated on May 1, 1975, in response to the urgent need for current data on the potential for developing new cropland.

USDA's Economic Research Service and Iowa State University Statistical Laboratory assisted in the design of the study, geared to use part of the sample sites from the 1967 Conservation Needs Inventory and to provide accurate regional and national data. As with the 1967 study, only nonfederal land and federal cropland were included—totaling 1.4 billion acres.

To carry out the study, SCS district conservationists visited 41,000 sites in 506 counties selected on a random basis. They determined present land use, problems in converting noncropland to cropland, and action needed to convert it to cropland—whether all that was needed was tillage or whether major work by farmers or federal agencies would be required. The district conservationist then met with representatives from other agricultural agencies in the county to determine for each site not in cropland what its potential for conversion would be in the next 10 to 15 years.

Information on prime farmland was provided by SCS state staffs. All of the data was then sent to the Statistical Laboratory for expansion to regional and national totals.



How much land is left in the United States that can be converted to cropland . . . how much cropland is going into urban development . . . what land use changes have occurred since the last comprehensive Conservation Needs Inventory in 1967?

These are among the questions answered nationally and by region in the Soil Conservation Service's potential cropland study of nonfederal lands completed this year.

Nationally, 111 million acres of land have the quality and availability for conversion to cropland. This potential cropland is about a fifth of the total cropland acreage and roughly equivalent to the acreage planted in corn, oats, and sorghum in the United States last year. It is well below former estimates that went as high as 266 million acres.

Irreversible losses of land to urban development are also higher than previously estimated. An average of 2 million acres a year

is urbanized and half of this is Class I to III land, with soils particularly suitable for cultivation. Since 1967, 16.6 million acres have been converted to urban uses and a third of this was cropped in 1967. Currently, another 24 million acres are being held for future urban use. Another million acres a year are being converted to ponds, lakes, and reservoirs and about half of this is Class I to III land.

Conversion to urban uses was highest in the Corn Belt, Southeast, Northeast, and Pacific regions.

The total land in crops, forests, and woodland has dropped in the last 8 years while pasture and range acreage has increased.

The land in crops dropped 31 million to 400 million; woodland and forest land dropped 70 million acres to 375 million; and pasture and rangeland increased 64 million to 571 million acres.

In the Great Plains, the study indicates that fewer acres of marginal land are being farmed. In the Corn

Belt, the acreage going out of cropland appears to be the more erosion-prone land.

Prime farmland in crops total 250 million acres in the 10 farm production regions. Another 24 million acres of prime land has a high potential for conversion to cropland. Much of the public land that can be converted to crops occurs in the Southern Plains, Appalachian, Northern Plains, and Corn Belt regions.

In brief, by farm production region, the study shows:

Northeast

Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont

Of the nearly 100 million acres in the region, 2.8 million went into urban use during the 8-year period and another 2.7 million are being held for urban use. More than half of the land converted to urban use was Class I to III.



In agricultural uses, only pasture and rangeland acreage increased. It rose 1 million acres to total 7 million acres in 1975. A net loss of 4 million acres of cropland was recorded in the 8-year period to bring the total to 17 million acres. Forest land showed a similar 4-million-acre loss, dipping to 63 million acres.

About 15 million acres are committed to noncropland uses, such as timber, urban, and wildlife, and have little or no potential for conversion to cropland. Land with a high or medium potential for conversion to cropland totaled 3 million acres.

Prime farmland totals 17.9 million acres and 8.9 million are in crops.

Corn Belt

Iowa, Illinois, Indiana, Ohio, Missouri

Most of the nearly 6 million acres that went out of cropland in the Corn Belt from 1967 to 1975 were erosive.

The study shows nearly 3 million acres in Land Capability Class

Since 1967, 16.6 million acres have been converted to urban uses. A third of this was cropped in 1967. Currently, another 24 million acres are held for future urban use.

III—with limitations due to moderately steep slopes, high susceptibility to water or wind erosion, or severe past erosion—had gone out of cropland since 1967. To some extent, this is because farmers, with larger units and increased mechanization, are spending their efforts on their better lands.

Some of this land was converted to pasture, as explained by a 6-million-acre increase in pasture since 1967 to total 29 million acres. Forest land decreased about 4 million acres to 25 million.

This region has the most prime farmland in the nation.

Of the nearly 77 million acres of prime farmland in the Corn Belt, 61 million are in cropland. Three million more need only to be tilled

to be converted to cropland. The total land in reserve with a high or medium potential for conversion to cropland is 15 million acres.

Land shifts since 1967 indicate that more than 4 million acres of what is now pasture and range came from forest land and that more than 8 million acres of cropland have gone into pasture.

Nearly 3 out of 4 acres in the Corn Belt inventory are in Land Capability Classes I, II, or III—land most suited for cultivation. Of the nearly 152 million acres of private lands in the Corn Belt, about 2 million were converted to urban use in 8 years. Nearly 60 percent of it is in cropland, and another 1.5 percent would require only tillage to convert to cropland.



Since 1967, more than 16 million acres have been converted to urban uses: a third of these acres were in crops in 1967 (far left photo). In addition, an average of 1 million acres a year are being converted to ponds, lakes, and reservoirs (at left). About half of this is Class I to III land—land with soils particularly suitable for cultivation.

Mountain States

Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming

This is the only region in the country where the acres in crops remained constant, at 40 million acres, from 1967 to 1975. The region has 14 million acres that have a high or medium potential for conversion to cropland. Only a small percentage of this reserve would be prime. There are 18 million acres of prime farmland in this region and nearly 90 percent is now in crops.

The acreage in pasture and rangeland increased sharply, from 188 million to 208 million, during the 8-year period and was primarily converted from forest land. Forest land decreased from 22 million acres to 14 million acres. It is important to note that the study covered only private lands. Much of the land in the Mountain States is federally owned.

Conversion to urban uses accounted for a small percentage of the land—less than one-half of 1 percent of the 275 million acres of privately owned land in the region. Only two-tenths of 1 percent of the land was being held in 1975 for urban development.

Lake States

Michigan, Minnesota, Wisconsin

This region—with 44 million acres in crops in 1975—had about 2 million fewer acres in crops than 8 years earlier. Forest land decreased by more than 3 million. Total land in pasture and range remained unchanged.

However, during the 8-year period about 1 million acres of forest land were converted to pasture and range and another million to cropland. Three million acres of cropland were converted to pasture and 2 million went out of production, some of it being held for urban expansion.

Of the privately owned land in this region, about 40 percent is cropland and nearly 1 percent is being held for urban use. One percent has been converted to urban use since 1967. Nine million acres with a high or medium potential for conversion to

Those regions with the least land with a high or medium potential for conversion to cropland in the contiguous United States are the Mountain States and the Northeast.

cropland make up the reserve. Of the 38.4 million acres of prime farmland, nearly 70 percent is already in crops.

Appalachian

Kentucky, North Carolina, Tennessee, Virginia, West Virginia

This region saw a 3-million net loss in cropland acreage from 1967 to 1975 to bring total land in crops to 20 million. Forest land also dropped nearly 2 million acres to total 63 million in 1975. Pasture and rangeland gained more than 3 million acres to reach nearly 22 million.

Urban land use took more than 2 million acres during the 8-year period, and water covered about 270,000 more acres for lakes, reservoirs, and ponds. An additional 3 million acres are being held for urban expansion and have a low potential for conversion to cropland.

Nearly 5 million acres, however, have a high potential for cropland with essentially no problems involved in conversion. A total of 11 million acres have a high or medium potential for conversion to cropland.

Of the 111 million acres of privately owned area in the region, 18 percent is in crops, 2 percent was converted to urban, and 1 percent is being held for urban use. Of the 26.4 million acres of prime farmland in this five state region, half are in crops.

Southern Plains

Texas and Oklahoma

The land in crops and forest in these two states decreased substantially from 1967 to 1975, with most of it going into pasture and rangeland. Cropland totaled 41 million acres in 1975—7 million less than in 1967. Forest acreage was more than halved, dropping from 39 million acres to 16 million. Pasture and rangeland, however, increased 20 million acres to total 139 million acres.

In the study, SCS determined nearly 11 million acres—most now in pasture and range—have a high potential for conversion to cropland. Another 140 million acres have little or no potential for conversion because of lack of dependable water, high erosion hazards, or commitment to noncropland use.

These two states have 67 million acres of prime farmland, 29 million of which are now in crops. Another 33 million acres are in pasture and range, with 6 million acres of that being readily convertible to crops. This is the greatest reserve of prime land of any region.

Progress in converting land poorly suited for crops into other uses showed up clearly in the 10-state Great Plains area. While marginal land accounted for more than one out of four acres of the 204 million acres in crops in 1967, it accounted for less than one out of eight of the 163 million acres in crops in 1975.

Last year, 41.8 percent of the land in crops in the Great Plains area had a severe erosion hazard. Eight years earlier, the figure was 43.5 percent.

Southeast

Alabama, Florida, Georgia, South Carolina

Since 1967, 2.6 million acres in the Southeast have been converted to urban use and additional acres are being held for urban development. Another 3.2 million acres have been used for reservoirs, lakes, and ponds, coming mostly from Class VII and VIII land.

Pasture and rangeland increased during the 8-year period, from 13.5 million to 18.8 million acres. Cropland dropped from 19 million to 16 million and forest land from 73 million to 65 million.

More than 10 million acres now in pasture, range, or forests in the Southeast have a high potential for conversion to cropland. In total the

The Corn Belt has 77 million acres of prime farmland, the most in the nation, 61 million acres are in crops . . . The Southern Plains has the greatest reserve of prime farmland of any farm production region.

Southeast has 18 million acres with a high or medium potential for conversion to cropland, the highest in the nation.

Of 60 million acres in the region with little or no potential for cropland, 22 million are committed to other uses; 22 million are in high density forests; and 16 million acres have problems of frequent flooding.

The region has 23.6 million acres of prime farmland, with about a third of it now in crops. Forests account for 9.5 million acres of it and pasture and range, 4 million.

Northern Plains

Kansas, Nebraska, North Dakota, South Dakota

Pasture and rangeland increased by nearly 4 million acres between 1967 and 1975, while cropland and forest land decreased. Land in crops totaled nearly 91 million in 1975, nearly 4 million below the 1967 figure. Forest land—at 1.5 million

acres—was half what it was 8 years earlier. About half of the forest land was converted to cropland and the remainder to pasture and range.

More than 12 million acres—primarily pasture and rangeland—have a high potential for conversion to cropland in the Northern Plains. A third of the acreage would require only tillage. In total, 17 million acres have high or medium potential for conversion to cropland.

Relatively few acres have been converted to urban use over the last 8 years—only four-tenths of 1 percent of the 183 million acres in the inventory. An additional 51,000 acres were held for urban use.

Delta States

Arkansas, Louisiana, Mississippi

Ten million acres in these states have a high or medium potential for conversion to cropland. Much

of the land change in these three states since 1967 is from forest to cropland, especially to soybeans. A total of 28 million acres have gone out of forest land. Cropland had a net addition of more than 1 million acres to total 20.2 million in 1975.

Since the 1967 inventory, 1 million acres have been converted to urban uses and to ponds, reservoirs, and lakes.

The region has nearly 30 million acres of prime farmland, with about half now in crops.

Pacific

California, Oregon, Washington

Since 1967, these three states have recorded decreases in cropland and forest land and an increase in pasture and rangeland.

Cropland was down from 25.3 million acres to 21.9 million; forest land, from 43 million to 36 million; and pasture and rangeland, up from 33.3 million to 38 million acres.

During this time, 1.3 million acres were converted to urban use and another 110,000 acres to ponds, lakes, and reservoirs. Two million acres are being held for urban development.

The study shows 2.7 million acres not now in crops have a high potential for conversion to cropland. The region has only 3 million acres with a high or medium potential for conversion to cropland—tying with the Northeast for the least potential cropland or any region in the lower 48 states.

Prime farmland totals 13.8 million acres, of which 8.9 million are now in crops.

Mr. Dideriksen is Director, Inventory and Monitoring Division, SCS, Washington, D.C.



For every acre taken by urban development, at least 1 additional acre is leapfrogged and isolated so that it, too, is no longer available for cropping.

Working Together For Quality Living

by Betty Joubert

In a town in Louisiana, flooding was an expensive and growth preventing problem until solved through cooperative efforts involving the Twin Valley RC&D.



District Conservationist Alvy Slatten and Mayor H. Truman Crawford inspecting a stand of browntop millet on a new ditch that will drain the Coushatta High School grounds.

"Working together for quality living" was the slogan coined by a group of Coushatta, Louisiana, citizens for their recently completed flood control project.

Nearly 8 miles of improved channels are now draining an area of almost 3,300 acres. H. Truman Crawford, mayor of Coushatta, believes the project is "the best thing that ever happened" for the town's 1,492 citizens.

Coushatta flooded with every 3-inch rain, and in some places water stood for weeks afterwards. "Water can stand in a field for a short while and there's little danger, but when it's in your home for even one second, you've got a very expensive problem," said Alvy Slatten, Soil Conservation Service district conservationist at Coushatta.

Flooding caused other problems as well. Coushatta had no well drained land on which new businesses could build. "The town's young people were finishing school and moving away because they couldn't find jobs or quality homesites here," said Mayor Crawford.

Coushatta citizens found solutions to these problems when the city became a cooperator with the Saline Soil and Water Conservation District and learned about the Twin Valley Resource Conservation and Development (RC&D) area.

Approved in 1969, the Twin Valley RC&D area covers 2,940,644 acres in the parishes of Caddo, DeSoto, Natchitoches, Red River, Sabine, and Vernon. Each parish sends a representative to steering committee meetings to discuss problems and

decide which are the most pressing. In 1970, the group decided that flood protection in and around Coushatta should be given top priority.

Early in 1971, SCS surveyed the area and helped RC&D leaders plan flood protection and control measures. The town of Coushatta and the Twin Valley RC&D agreed to finance the project.

Construction started in June 1973. And, only 3 years later, the town of Coushatta is seeing the benefits.

Because the improved channels carry off rainwater more quickly, residents in the former flood area no longer have to worry about water entering their homes or standing in their yards. This stagnant water is no longer a breeding place for mosquitoes, cutting Coushatta's mosquito control program needs almost in half.

The State Department of Highways built new culverts and two new highway bridges in conjunction with the project. Central Louisiana Electric Company and South Central Bell replaced lines removed during construction.

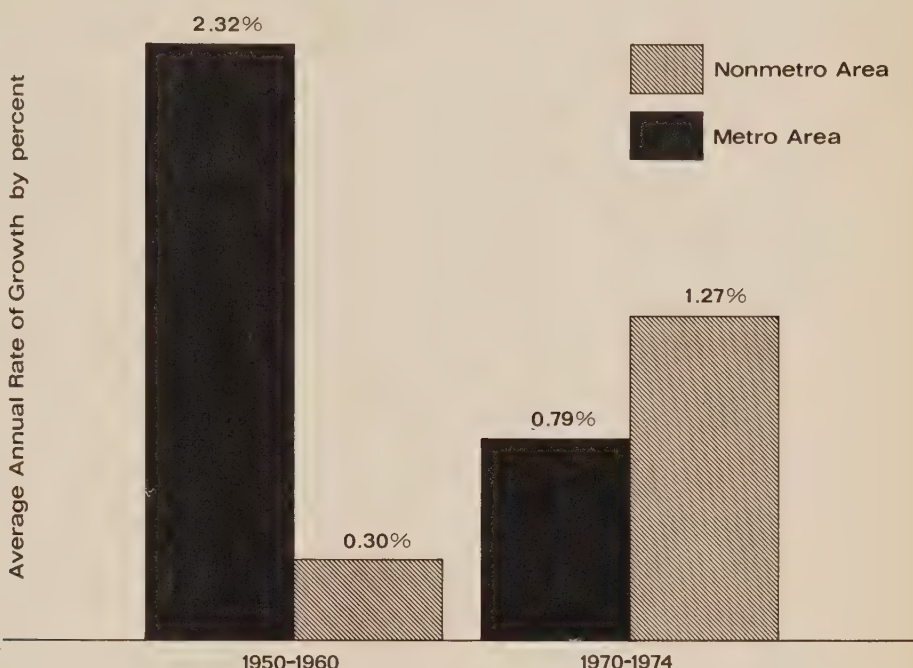
Assured that their property would be flood-free, many businesses tore down their old buildings and built more modern ones. Land that was once considered unusable is now dry and available for construction. Thirty lots are surveyed and ready for development.

The project helps check erosion on nearby channels and bayous. It also restored 100 acres of fish and wildlife habitat in the area.

Ms. Joubert is public information specialist, SCS, Alexandria, Louisiana.

In its 1976 annual report, the Council on Environmental Quality analyzes population shifts in the United States since 1970—including why nonmetropolitan areas are growing at a greater rate than either metro areas or the nation as a whole.

U.S. Population Shifts Toward Rural Areas



For the first time in our 200-year history, nonmetropolitan areas of the United States are growing in population faster than metropolitan areas.

Between April 1970 and July 1974, counties not included in a Standard Metropolitan Statistical Area grew 5.6 percent. During the same time, metropolitan areas grew only 3.4 percent, and U.S. population as a whole increased 4.0 percent.

These increases have resulted in an average annual rate of population growth of 1.28 percent for nonmetropolitan areas, 0.79 percent for metro areas and 0.92 percent per year for the United States as a whole.

This significant change in U.S. population trends is analyzed in *Environmental Quality—1976*, the 7th annual report of the Council on Environmental Quality.

The report notes that—

- Growth outside urban areas has taken place in all major regions of the U.S. The shift was first noted in the midsixties in such areas as

the Great Lakes cutover lands, the Ozarks, Tennessee Valley, and Texas Hill country, and now includes many areas of the West and South. Most of these same areas were losing population during the decade 1950-60.

- The growth in rural areas is not limited to counties adjacent to cities. Further, nonmetropolitan counties with small towns and villages and those with no town of more than 2,500 residents—the most rural areas of the country—are now growing as fast as counties with much larger towns.

- In 1970-74, some 1.6 million more people moved into nonmetropolitan areas than left them. This is in direct contrast to previous trends.

- The flow of people into rural areas is about equally divided between those coming from central cities and those from suburban areas.

Environmental Quality—1976 explores several possible reasons for the shifts—

- A large proportion of the American people now expresses a preference for living in rural areas.
- People who live in rural areas are more apt to be satisfied with where they live than town and city residents.
- Growth of the Interstate Highway System now makes it possible to commute more miles from country to city.
- Movement of farmers and their families off the land—a trend since the 1920's—seems to have stopped.
- Unemployment in rural areas is now below the rate in metro areas, and incomes are increasing faster. Rural poverty has dropped substantially.
- Retirement settlements have sprung up in many rural areas besides California, Arizona, Florida, and Cape Cod. Retirement areas now include 8.6 million people in 360 counties.

Kansas Engineer George R. Smith began his soil and water conservation career nearly 42 years ago on an erosion control project in Kansas. He recalls those early days—when trainee engineers were paid 40 cents an hour and equipment was run day and night to help farmers convert from straight row to contour farming.

by George R. Smith

Pioneering on the Conservation Frontier

Two things were obvious to the 20 trainee engineers and soil scientists who went to Mankato, Kansas, in February 1935 to join Limestone Creek Erosion Control Project staff. The land needed us and we needed work.

Most of us had graduated a year or more earlier—at a time when finding a job was almost as difficult as keeping Kansas topsoil from blowing into the Atlantic Ocean. We were getting a chance to help solve both problems.

The Limestone Creek project was one of 40 erosion control projects around the country established under the technical direction of the Soil Erosion Service (SES). Soon after the project was started in 1934, a local newspaper called SES “the largest employer of labor in Jewell County.”

Manager of the project was Dr. Frank L. Duley, who organized a technical staff of soil scientists, agronomists, foresters, and engineers. The project had four associated Civilian Conservation Corps (CCC) camps—at Burr Oak, Lebanon, Esbon, and Ionia. Each 200-man camp was administered by the U.S. Army, with civilian supervisory and technical personnel directing



work on conservation measures.

"SES trainees" became "SCS trainees" in April 1935 when the Soil Conservation Service assumed the activities of the Soil Erosion Service. Trainees were paid about 40 cents an hour for 44 hours of work a week, providing us about the same income as people who were on relief at the time. But rooms were available at \$2 a week and meals cost a quarter.

Most of us carefully managed our money during the 6-month training period so we would be able to purchase the expected SCS "uniform" of forest green shirt, boot pants, and ranger hat, and a horsehide jacket complete with brass buttons. A good pair of oil-tanned field boots was the biggest single expense at \$20.

Although enrollees at some of the early CCC camps in Kansas worked on U.S. Forest Service projects, most were assigned to work with SCS and early conservation districts on demonstration projects and on construction of multiple-purpose state lakes such as Seneca, Lone Star, and Toronto.

Project Manager Duley helped develop the concept of providing technical assistance to farmers and

ranchers in their efforts to control soil erosion and conserve soil and water resources.

Staff members sought out farmers and ranchers who were willing to have their land treated with conservation practices such as terraces, diversions, vegetative waterways, grade stabilization structures, ponds, pasture furrows, tree and shrub plantings, dams for gully control, and seeding eroded cropland to adapted grasses.

Everything was furnished by the federal government without cost to the landowner—technical services, equipment, materials, and labor. But, it still took some persuasion from conservation-minded neighbors to get the job done.

At the time, terracing was seen as the primary conservation need. To meet the demand and to best use the heavy earthmoving equipment involved, CCC operators worked 10-hour shifts around the clock.

Most farmers used light, horse-drawn equipment: There were very few tractors on Kansas farms at the time. So, CCC workers used government equipment to rework the cloddy soil to farmable conditions after installing the terraces.

The story often was told that a

farmer would go to bed after watching us stake out a field and wake up with some surprise the next morning to see that he had been transformed from a straight-row to a "contour conservationist." (It could have been true, for the CCC construction crews spent anywhere from 1 to 3 days on a typical 160-acre operation.)

In addition to conducting the demonstration work, the Mankato staff prepared trainees to take on the anticipated expansion of the SCS and CCC conservation work into other counties. I went on to three similar assignments, including one in Labette County where the state's first conservation district was formed.

World War II brought the closing of the CCC camps and an end to the strange sight of big terracing equipment moving through the darkness of the Kansas plains, lights shining ahead and behind to keep sight of stakes that had been placed the day before.

Mr. Smith is state conservation engineer, SCS, Salina, Kansas. He is retiring next month.



Scene from the thirties: a stockwater pond under construction in Kansas. The pond was put in to help the farmer distribute his water supply for livestock to prevent overgrazing and control erosion.

Game Birds Spring Up On Native Pasture

by Lyle Asell,
Ronnie George,
and Jack Coffey



Native grass prairies are making a comeback in southern Iowa as pastures for cattle. A new study shows that they are also providing excellent nesting sites for both game birds and songbirds.

Game birds, cattle, farmers, and hunters may all be the winners if recent interest in native prairie grasses continues in southern Iowa.

In the last 5 years, farmers have seeded 4,000 acres to native "warm season" grasses that produce excellent pasture for cattle during summer months. A recent study shows that the plantings also produce an environment that dramatically increases the nesting successes of both game birds and songbirds.

Ring-necked pheasants, for example, built a third more nests in switchgrass, one of the native grasses studied, than in an alfalfa and orchardgrass pasture, and the number of successful nests—where chicks hatch—was also high. Wildlife biologists located 38 nests on 138 acres of switchgrass and determined that nearly half the nests were successful. The successful nests averaged one per 8½ acres of switchgrass.

On the other hand, the biologists located only 11 nests on 66 acres of a cool season pasture of alfalfa and orchardgrass. All of these nests were destroyed during normal hay mowing in the spring and 8 of the 11 hens were killed. Pheasants in Iowa prefer the alfalfa-orchardgrass hayfields for nesting.

The study, begun 3 years ago, was initiated through sponsors in the Chariton Valley Resource Conservation and Development area. Participants include the Iowa Conservation Commission; the Soil Conservation Service; the Lucas, Wayne, and Appanoose Soil Conservation Districts; the U.S. Army Corps of

At far left, this pheasant nest was one of 38 found in a study of 138 acres of switchgrass, one of the native grasses studied. At near left, a bobwhite quail.



Engineers; and several area farmers.

The key to success for wildlife, the study indicates, is the same high-level management practices that farmers use to maintain native grasses such as switchgrass, indiangrass, and big bluestem.

This includes not grazing pastures until early July and not grazing closer than 8 inches to the ground. The planned grazing assures that the pastures are not being grazed during the heavy nesting periods of May and June, and that cover is left for the following winter and spring.

In contrast, "cool season" pastures, with such grasses as brome, orchard, and bluegrass, reach their peak production during the spring and fall and are grazed or mowed during the wildlife nesting season.

By rotating cattle between two pasture types, farmers use each when growth and forage quality are at their peaks.

With the growth of this rotation system, in southern Iowa in recent years, the study was aimed at determining the possible effect of the system on game birds and songbirds. To achieve the goal, wildlife biologists have searched 240 acres of native grass for nests in the last 3 years.

They discovered 137 nests—57 of ring-necked pheasant, 5 of bobwhite quail, 5 of mourning doves, and 70 of songbirds.

The study shows—

—Pheasant nesting densities were highest in mixed native grass, in little bluestem, and in switchgrass.

Pheasant nest success was greatest in mixed native grass and in switchgrass.

—Quail nesting densities and nest success were greatest in little bluestem.

—Mourning doves had the greatest nesting densities and nest success in indiangrass. This may be as a result of a greater amount of bare ground between clumps, providing doves with more areas to nest and a more diverse food supply.

—Songbird nesting densities were highest in big bluestem. Common songbirds nesting in the native grasses were red-winged blackbirds, eastern meadowlarks, dickcissels, yellowthroats, and field sparrows.

The ongoing study began in 1973 when wildlife biologists seeded 13 plots totaling 69 acres to native grasses at Lake Rathbun, a U.S. Army Corps of Engineers project authorized for flood control and recreation in southern Iowa. Later in the study, three more plots totaling 40 acres were added on private land.

SCS provided technical assistance with information on both seeding establishment and management of the native grasses and in cattle stocking rates and grazing periods. The SCS plant materials center at Elsberry, Missouri, provided switchgrass, indiangrass, and big bluestem for the study.

The Iowa Conservation Commission provided labor, equipment, and materials; established the study plots; collected field data; and evaluated results.

The study plots for the native grasses ranged from 5 acres to 20 acres and were treated to simulate private management of warm season pastures. They were mowed for hay in July; grazed during July and August; and harvested for seed in September.

Wildlife biologists made intensive searches for nests in the pure stands of switchgrass, indiangrass, and big bluestem in 1974, 1975, and 1976. Mixed stands of the three species and an actual prairie remnant, consisting mostly of little bluestem, also were included in the study.

To provide a direct comparison of nest density and success in cool season hayfields, privately owned alfalfa and orchardgrass hay meadows adjacent to the study area also were searched.

Results of the study to date appear promising and would indicate that as more acres are planted to native grass pastures, both the livestock and wildlife will benefit.

Mr. Asell is biologist, SCS, Des Moines, Iowa.

Mr. George is wildlife research biologist, Chariton Research Station, Iowa Conservation Commission, Chariton, Iowa.

Mr. Coffey is wildlife management biologist, Rathbun Wildlife Unit, Iowa Conservation Commission, Chariton, Iowa.

Unclogging the Cocheco River

by Charles H. Dingle
and Gordon L. Leckie

In New Hampshire, a conservation district supervisor had a dream of returning the Cocheco—which had become “little more than a clogged-up river”—to a haven for wildlife and people. This Bicentennial year, it happened.

While cities across the nation observed the country's 200th birthday with parades and fireworks, members of the Strafford County Conservation District (CD) in New Hampshire participated in a river cleanup project to celebrate their town's heritage.

Bob Hussey, Strafford County CD supervisor, recalled that, “When I came back to Rochester after World War II, the Cocheco River was little more than a clogged-up sewer. It was choked with debris and so polluted that even the muskrats were dying. Since that day, I've dreamed of seeing the Cocheco returned to a haven for animals and a place for trout to spawn. I knew we could do it because clear, cold spring water was still flowing into the murky Cocheco.”

After 3 years of planning, Hussey, with the help of Dave Bennett, district conservationist for the Soil Conservation Service in Rochester, and Janice Lygren, a fourth grade teacher and a district board member, began to organize townspeople in June 1976 for the big cleanup.

As coordinator, Hussey contacted nearly 40 landowners who control access along the river. “Not one turned me down,” he said.

Maureen Stabile, district clerk, wrote letters and telephoned local residents and businessmen to solicit volunteer labor and donated equip-

ment. “The response was tremendous; everyone seemed eager to contribute,” she said.

Mayor John Shaw offered city-owned equipment for the cleanup. He also offered to follow up on the project by finding a way to eliminate the sources of raw sewage.

In early August, Hussey, a professional logger, coordinated work parties to clear access roads to the river. Local firms donated chain saws and logging equipment.

The months of planning and preparation culminated on Saturday morning, August 28, when about 150 townspeople gathered to clean the Cocheco. At 7 a.m., Hussey turned the control valve at the upper dam to stop the river. The Salvation Army was on hand at the Fairgrounds to serve coffee and donuts to workers. The Rochester Fire Department Local 1451 stood by ready for action in case of emergency. Dr. Alexander Smith, head of the medical staff at Rochester Hospital, instructed his emergency staff to treat injuries free of charge. The local chapter of the national REACT team coordinated the operation with its two-way radio system.

Mrs. Lygren shuttled people, supplies, and messages from one end of the cleanup area to the other. She accompanied a local newspaper reporter to key action spots on



the river. The event was reported by TV, radio, and newspapers throughout the state.

Workers concentrated on the 1.7 mile stretch of the river between Wyndotte Mill Dam and Gonic Dam, where a city park is envisioned. This 10-acre wooded area, in the heart of the city, was donated for a park about 50 years ago. The river cleanup spurred renewed interest in developing a park and outdoor conservation education center.

The most unusual workers were a pair of oxen owned by Frank Scruton of the Rochester area. With their tremendous strength, the oxen—a show team—were able to dislodge logjams that heavy equipment could not reach.

Townspeople dragged tires by the hundreds from the riverbed. Twenty-five shopping carts were retrieved.



View from a bridge: Conservation district supervisor Bob Hussey pulls debris from the edge of the Cocheco in downtown Rochester, New Hampshire. Below: Car seats are tossed and tires are pulled from the river as volunteers more than "pull their own weight."



They pulled out mattress springs, refrigerators, and garbage. The riverbank was lined with everything from plastic flowers to stoves.

Most of the cleanup ended in October with grading and seeding along the riverbank to stop erosion.

To keep the river clean, a new city ordinance imposes a \$100 fine for throwing trash in the Cocheco.

Hussey's enthusiasm is contagious: the citizens of Dover, downstream from Rochester, are now planning a cleanup project of their own.

He hopes to see the entire length of the Cocheco soon fit for both people and wildlife again.

Mr. Dingle is assistant state conservationist, SCS, Durham, New Hampshire. Mr. Leckie is public information officer, Northeast Technical Service Center, SCS, Broomall, Pennsylvania.



Nebraska Snow Job



Above: The "new look" in Valley County. This living snow fence consists of rows of eastern redcedar, Austrian pine, hackberry, and honeysuckle. At right: County road crews still carry out the winter ritual in most areas of putting up snow fences.

To offer protection to motorists and wildlife alike during Nebraska's cold winters, a natural resource district has initiated a program to plant living snow fences.

Putting up wooden slab fences to prevent snow drifting on county highways is a Great Plains winter ritual.

But in central Nebraska, the scene is changing.

In the last 2 years, 10 cooperators with the Lower Loup Natural Resources District (NRD) have agreed to put in nearly 4 miles of living snow fences.

The tree plantings are to provide cover for wildlife, but will also save the county roads department an estimated \$3,800 a mile for new snow fence installation and \$300-a-mile annual maintenance costs.

To participate in the living snow fence program, a farmer or rancher contributes a strip of land 100 feet wide along a county road for a 10-year period. He must agree to remove it from agricultural production and to exclude it from livestock.

The Lower Loup NRD provides fencing materials and plants the seedlings. The Soil Conservation Service, through the district, provides technical assistance in planning and designing the tree belts.

The Valley County roads department puts up the fences, prepares the ground, controls weeds until the seedlings are established, and replenishes the stock for 3 years.

The Agricultural Stabilization and Conservation Service provides cost-

sharing assistance to participants for trees and planting.

"The combined living snow fence and wildlife habitat program entails planting three rows of conifers, primarily redcedar," said Dick Beran, general manager of the Lower Loup NRD.

"About half of the area is planted to trees and the rest is left undisturbed for wildlife nesting and roosting cover. Some of our plantings this year include a row of shrubs in the wildlife area for additional cover and food," he said.

The idea is spreading to other parts of the NRD, the largest in the state. For example, a local wildlife club plans to plant several rows of milo between the rows of trees to provide food for wildlife and to reduce winter damage to the new seedlings.

A bonus of the program has been recognition of the NRD for its efforts. The Nebraska chapter of the Society of American Foresters has presented the NRD with its award for outstanding contributions to forestry for 2 consecutive years.

Mr. Carr is forester, SCS, Lincoln, Nebraska



Clubwork and Conservation

by Chris Williams

Jerri Wagner's interest in clubwork and conservation has opened many doors—from conservation district supervisor to mayor of Prescott, Arizona, to president of the 10-million-member General Federation of Women's Clubs.

The new president of the General Federation of Women's Clubs (GFWC) is a conservationist.

Jerri Wagner was born and raised around conservation on a Texas farm and has practiced and promoted conservation in California and Arizona in many roles, from club member to mayor. Her strong interest in the wise use of natural resources will be demonstrated now from Washington, D.C., where she will live for the next 2 years in the historic N Street headquarters of the 10-million-member Federation.

"Conservation has always been an important and strong part of our program," Mrs. Wagner said. "The Federation was founded in 1890

Winding up her term as mayor this year, Jerri Wagner will be moving to the nation's capital for 2 years.



and by the turn of the century, members had adopted a strong conservation resolution."

Mrs. Wagner's own leadership in conservation is apparent. She and her husband Harry and their three daughters moved to a ranch in Prescott 20 years ago, and she has been a supervisor for the Chino Winds Natural Resource Conservation District nearly half of those years.

Elected to the city council at about the same time, she helped found the Cocopai Resource Conservation and Development (RC&D) Council and became its first chairman. From there, she helped found the Arizona Association of RC&D Areas—and became its first president.

Her interest in land use planning and natural resource conservation brought her prominence and led to her election as mayor of Prescott 2 years ago. She is the first woman to be elected mayor in Arizona.

As mayor, she is especially proud of the completion of the new library and the beginning of a sewer system for the 110-year-old town of 17,000.

"By providing an 'open door' approach not only for residents but also for employees, we have listened to and solved many problems and developed a cooperative effort," she said.

She attributes this success partly to her work with RC&D. "The RC&D concept provides a unique oppor-

tunity for solving local problems," she said. "The successes we had were because local people and many representatives sat down together and communicated. The people stated their problems and someone had a program or solution for them."

Mrs. Wagner sees her own success as a result of volunteer activities.

"You can walk to the top as a volunteer," she said.

"As a young wife and mother 34 years ago, I would have climbed the walls if it hadn't been for club activities.

"Working in executive capacities in women's clubs is the best training currently available for women who want governmental and industrial positions of responsibility."

This year, the Federation launched a series of regional conservation seminars with the theme "Improving the Quality of Life."

The week-long seminars are sponsored by the Federation and Shell Oil Company to train leaders and members of the GFWC to work with groups within states and to extend and improve conservation programs.

The seminars will include panel discussions, field trips, and study sessions with specialists in energy and resource management.

"Local clubs have always promoted conservation in their communities. This program is aimed at enhancing that role," she said.

In addition to conservation, Mrs. Wagner has a special interest in art and international relations. She has selected these two fields as subjects for special emphasis during her term.

"I have a theme for my term," she said. "It is 'Arise, activate dreams.'"

"These words are a challenge to each of us. Through dedication and effort we can make our dreams a reality.

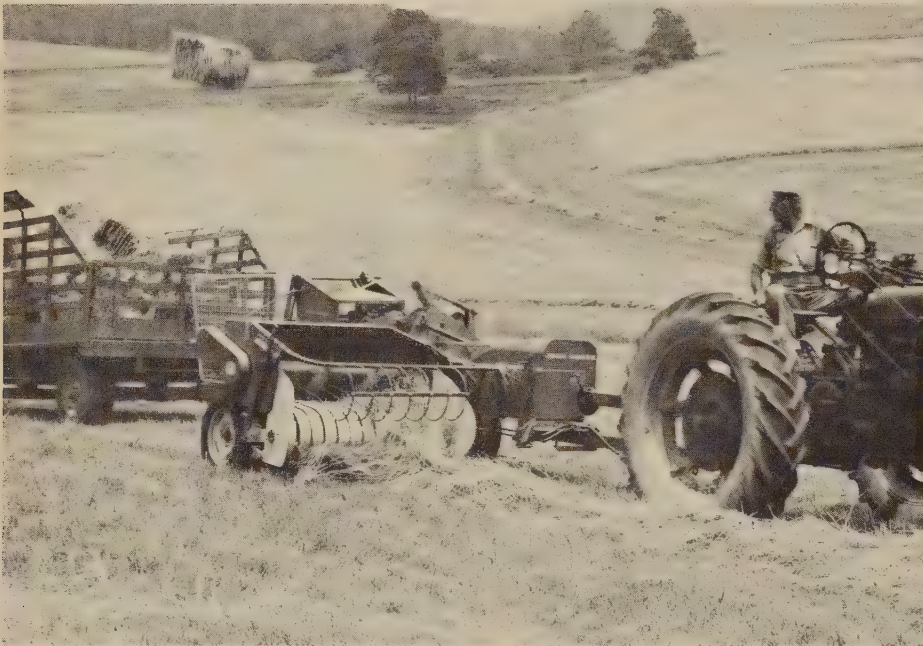
"To do this requires time and perseverance. But if you get people behind you and work with elected officials, the end result will be met."

Mr. Williams is public information officer, SCS, Phoenix, Arizona.

In Tune With Conservation

by Gary E. Conant

The Staith brothers have a showplace farm in Harrison County, one of the fastest growing counties in Indiana. Now carefully preparing part of their land for a subdivision, they want to show "that conservation is vital in farming and subdivision development."



Ward Staith bales hay on the farm he and his brother converted from cropland shortly after World War II.

Ward, wrapped up in his sousaphone, can be seen playing circus band music around the country and at the annual meetings of the Harrison County SWCD in Indiana.



When two brothers who have spent more than a quarter of a century developing a "picture postcard" farm decide to develop part of it for homesites, how do they go about it?

"Clarence and I want to show people that conservation is vital in farming and in developing a subdivision," explains Ward Staith, who recently retired from the board of the Harrison County Soil and Water Conservation District (SWCD) in southern Indiana after nearly 25 years of service.

Clarence and Ward Staith began their work in conservation shortly after returning from the war 30 years ago. They joined the newly formed SWCD and, with assistance from the district, developed a conservation plan for their farm. When the soils map showed their farm to be mainly Class VI and VII land—too steep and eroded for crops—they decided to convert it from crops to pasture and hay.

That wasn't easy. Farm machinery was scarce, and they had to put their names on a waiting list for a tractor and a bulldozer. The tractor came first and they began to convert the farm. Hooking up a 3-bottom plow, they built more than 22,000 feet of diversions to control runoff on their long, steep slopes.

"Over the next few years, Ward and I filled in washed-out gullies, cut sassafras, cedars, and broomsedge, and seeded tall fescue, orchardgrass, lespedeza, and clover," recalls Clarence.

When the bulldozer arrived, the Staiths got into earthmoving work. As contractors, they installed many conservation practices on farms in their community.

When they decided about 10 years ago to convert their farm into a subdivision with minimum lots of 2 acres, they again incorporated conservation into their planning.

"We're well aware that developed land can create more of an erosion and runoff problem than agricultural land," Ward said. "We're applying conservation measures during development so that the new residents won't have to tackle these problems after their homes are built."

"We feel our conservation work will pay for itself. The neat, grassed lots will help sell themselves."

The brothers remove the sod as they put in roads and place it around culverts, on waterways, and on the bottom of roadside ditches. They seed the ditchbanks and they sod drainageways in the woods, providing both erosion control and pathways for homeowners.

With the interstate highway completed through southern Indiana this year, and their property now within commuting distance of Louisville, Kentucky, the brothers sold their first lot. They plan to develop gradually, starting with a 21-acre area.

The brothers are also busy planning what they believe will be the nation's first museum on the history of circus band music.

Both are active members of the Windjammers, a national organization of circus band musicians and fans. Ward is its secretary and plays the sousaphone at circus performances near and far.

He remembers the days when circuses had their own traveling bands for parades and performances and when music was written especially for circus acts.

With this tradition fading, the Staughts want to memorialize it in a museum financed through a trust fund from profits from the subdivision. They plan to donate a 60-acre plot on which Ward and his wife live to the Windjammers for the museum. Ward has more than 1 million feet of circus music he has taped and plans to give to the museum.

Meanwhile, the brothers are keeping circus music very much alive in Harrison County. They have played at the annual SWCD meetings for nearly a quarter of a century. In recent years they have provided entertainment for nearly 500 people at these meetings with full performances provided by circus musicians from around the country.

Mr. Conant is district conservationist, SCS, Corydon, Indiana.

Tough 'Tioga'

by Jack R. Carlson and Wendall R. Oaks

Finding plants that will do well under harsh conditions and provide erosion control is always a challenge. At SCS's plant materials center in New York, 'Tioga' deertongue has been developed to provide a vigorous cover—with little or no maintenance—on acid mine sites.

You might say that deertongue "volunteered" for the job.

Plant materials specialists from the Soil Conservation Service observed the native grass, *Panicum clandestinum*, growing on surface-mined land in the Northeast under harsh, acid conditions.

With millions of surface-mined acres in need of a low maintenance ground cover, the specialists assembled deertongue ecotypes from throughout the Northeast at the SCS Plant Materials Center in Big Flats, New York. They screened them for their adaptability and conservation value on acid mine spoil.

The final product is 'Tioga' deertongue, released last year cooperatively by SCS, Pennsylvania State University, and Cornell University. This year, commercial producers harvested seed in New York and Pennsylvania, and expect to market it next year.

'Tioga' is the result of blending 20 strains of deertongue, each of which showed greater acid tolerance than other plants frequently used on mine spoil, including tall fescue, crownvetch, and ryegrass. 'Tioga' has been successfully field tested on acid mine spoil with pH values of 3.5 or lower and normally toxic levels of aluminum and manganese, commonly found around surface-mined areas.

'Tioga' deertongue is a warm season, perennial grass that grows 1 to 3 feet tall. It spreads by seeds which are easily harvested. Its leaves, 1 inch wide and 4 to 8 inches long, are shaped like a deer's tongue—hence, its common name.



Well adapted to barren soils and nearly all moisture conditions, 'Tioga' provides a dominant, vigorous cover on acid mine sites and requires little or no maintenance. It also does well on low-fertility, acid soils, as in gravel pits, where plants such as tall fescue require high maintenance.

With most surface-mined areas in the Northeast being reclaimed for woodland and wildlife habitat, 'Tioga' deertongue has the added advantage of being compatible with young trees. It provides a low-competitive ground cover for reducing erosion in woodland plantings.

Like many other pioneer plants, 'Tioga' deertongue cannot compete where other conservation plants are better suited. It does not do well—and should not be planted—on neutral, high-fertility soils.

Mr. Carlson is manager, Big Flats Plant Materials Center, SCS, Big Flats, New York.

Mr. Oaks is a soil conservationist, SCS, Big Flats, New York.

Conservation With an Artist's Touch

This scene from the past—a horse-drawn schoolbus—by Mrs. Paul has been on the cover of *The Farmer* magazine and in the 1975 Yearbook of Agriculture. (Courtesy of The Farmer, The Webb Company, St. Paul, Minnesota.)

Beauty is where you find it . . . and Dorothea Paul has found it with an artist's touch as near as the farms around her in her native Minnesota.

Dorothea Paul has put conservation practices on her land for a quarter of a century. Now she is putting them on canvas.

Her paintings have been on the covers of some of the nation's leading farm magazines, in USDA's Yearbook of Agriculture, in seed catalogs, in national exhibits, and even in her soil and water conservation district office in Olivia, Minnesota.

"I want pictorially to make a history of farming," she explained. "Most of my paintings are of old-time scenes with horse-drawn equipment. I ask my neighbors about the old days and go through old parts books from implement manufacturers. After all, many of the people who remember those days won't be around much longer.

"I also want to show what it is like, what it feels like, to be on a farm and live in a rural area."

Mrs. Paul knows what it is like, for she has known farming nearly all her life. At the age of 10, she was planting corn with real horse power on her father's farm.

Today, she farms 320 acres of prime agricultural land in southern Minnesota near Morton. She grows peas and corn for nearby canneries as well as soybeans, oats, and wheat. She does all the work herself with the exception of harvesting. "It's just not economically feasible to buy a \$60,000 combine," she explained.

She and her husband George, who works for the state highway department, have three grown children.

Mrs. Paul got into painting about 11 years ago when she switched to crops after raising cattle.

"I had some spare time and I was looking for something different to do," she said. Her only training in art was a design course she had taken



as a student at the University of Minnesota. She began taking art courses at home and has since studied in Nebraska and Texas.

"I really got my start when the Minnesota Farmer used two of my paintings in 1972, one on the cover and one inside."

Since then, she's found her "something-different-to-do" hobby has taken her around the country, including Hawaii, to paint and to exhibit. She has painted farm scenes for people and companies in 48 states and 7 foreign countries.

She frequently paints on a theme she knows well: Conservation. A long-time cooperator with the Renville Soil and Water Conservation District, she was the first woman in the state—in 1964—to be selected as an outstanding conservation farmer by the Minnesota Tribune.

The conservation practices she has carried out on her farm include terracing, contour stripcropping, drainage systems, conservation cropping systems, and the planting of 1,700 trees.

"These practices have really paid off over the years," she said. "The contours and terraces really saved my field 4 years ago when we had 12½ inches of rain in 7 hours."

More recently, during Minnesota's "Blizzard of the Century" on January 11, 1975, her farmstead windbreak "really kept the snow out of my yard. I'm now planning a windbreak strip around the edge of the farm to control wind erosion."

Once a year, she flies with a neighbor in his crop sprayer to take photographs of farms for layouts in her paintings. That is when she sees conservation from yet another perspective.

"You've never seen anything prettier from the air than contour stripcropping. It's just beautiful—to look at, to paint, and, of course, to protect your soil," she said.

Mr. Bidinger is a soil conservation technician, SCS, Olivia, Minnesota.

Meetings:

December

- 6–10 American Geophysical Union, San Francisco, Calif.
- 7–9 American Seed Trade Association, Inc., Sorghum Research Conference, Chicago, Ill.
- 8–9 American Forest Institute, San Francisco, Calif.
- 9–10 American Seed Trade Association, Inc., Soybean Research Conference, Chicago, Ill.
- 10–17 International Symposium on Land Subsidence, Sponsored by International Association of Hydrological Sciences, Anaheim, Calif.
- 13 "Drainage for Increased Crop Production and a Quality Environment," Sponsored by American Society of Agronomy, Crops Science Society of America, and Soil Science Society of America, Chicago, Ill.

January

- 9–12 American Farm Bureau Federation, Honolulu, Hawaii
- 9–13 National Council of Farmer Cooperatives 48th Annual Meeting, San Juan, Puerto Rico
- 10–14 North American Game Breeders and Shooting Preserve Association National Convention, Milwaukee, Wisc.
- 16–19 National Wool Growers Association—National Lamb Feeders Association Convention, Monterey, Calif.
- 30–Feb. 5 American National Cattlemen's Association Annual Convention & Trade Show, Atlanta, Ga.

February

- 2–5 Catfish Farmers of America, New Orleans, La.
 - 6–10 National Association of Conservation Districts, Atlanta, Ga.
 - 8–12 American Seed Trade Association, Inc., Garden Seed Conference, New Orleans, La.
 - 13–15 Sprinkler Irrigation Association Technical Conference, Salt Lake City, Utah
 - 14–18 Society for Range Management Annual Meeting, Portland, Oreg.
 - 20–25 American Association for the Advancement of Science, Denver, Colo.
 - 22–25 Land Improvement Contractors of America, Orlando, Fla.
 - 23–24 Southern Forest Institute, Inc., Houston, Tex.
 - 25–28 American Association of School Administrators Convention, Las Vegas, Nev.
 - 27–Mar. 5 American Society of Photogrammetry, Washington, D.C.
-



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Soil Surveys: Made to be Used

From the Administrator

Thanks to new technology and better management, production of the National Cooperative Soil Survey is on schedule for the first time in many years.

We also are producing more surveys than ever. As recently as 1970, we sent only 40 completed surveys to the printer. In fiscal year 1976, we sent off 101 surveys, and our target for this year—FY 1977—is a record 150 surveys.

We have reduced the time between completion of the survey and its appearance in published form. The lag used to be as long as 7 years. We have reduced that lag time considerably, and have demonstrated that we can achieve our goal of publishing a survey within a year of its completion.

It has taken many changes and innovations to speed up our publishing program. For example, we are now using the most up-to-date word processing techniques available to prepare survey manuscripts for the printer. SCS typists transfer manuscripts to magnetic tapes after the first editing. Subsequent editorial changes are made on the tapes, which are processed to run a photocomposition machine at the U.S. Government Printing Office that sets type automatically. What used to take days to accomplish is now completed in a matter of minutes.

We also have made soil surveys easier to use. Detailed descriptions of each type of soil, largely of interest to soil scientists, are in one section of each publication. Interpretations of mapping units and interpretative tables, which show the behavior of soils for various practical uses and are of interest to most readers, are contained in another section.

With all these innovations in production taking place, it is time we began streamlining the publicity, distribution, and use of surveys.

While the soil survey is in progress, conservation district supervisors, SCS employees, and all who participate in the survey need to make plans for getting it understood and used by the ultimate consumer. That means farmers, ranchers, builders and developers, state and local agencies—everybody concerned with soil and water.

Presentation ceremonies, television and radio shows, meetings sponsored by various organizations, feature stories in local newspapers—all are necessary to help people understand how to use these valuable surveys.

The right kind of promotion may require hard work and long hours for a few weeks, but that is a small investment compared to the hours and dollars that go into producing each survey. A soil survey is of no use to anybody stored in a carton or gathering dust on a shelf.

A handwritten signature in dark ink, appearing to read "R. M. Davis". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Soil Conservation is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil Conservation* has been approved by the Director of the Office of Management and Budget through July 31, 1978.

Bob Bergland
Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

Prepared in the Division of Information,
Soil Conservation Service,
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Cover:
Conservation practices as seen from
the air often create striking
patterns—like this terrace system
in Iowa, designed to slow down rain
runoff and protect soil from washing.
(See page 12 for picture story.)

Soil Conservation

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Marine biology field trips are part of environmental studies program taught by award-winning Biloxi High School teacher Della McCaughan.

From Coastline to Classroom

A national awards program to recognize innovative conservation education projects drew a wide variety of entries. Winners will be honored next month.

A New Hampshire teacher and an Oklahoma conservation district took top honors in the 1976 Environmental Conservation Education Awards Program, sponsored by the National Association of Conservation Districts (NACD) and Allis Chalmers.

Mrs. Lillian Scranton of Claremont, New Hampshire, was named Conservation Teacher of the Year, a \$1,500 award. Mrs. Della McCaughan of Biloxi, Mississippi, won the \$300 second place award.

Pontotoc County Conservation District (CD), Ada, Oklahoma, won the district award for excellence in environmental education, \$1,500. Second place in the district category went to York CD in South Carolina, \$300.

The national winners will be honored during the annual NACD conference, February 6-10, 1977, in Atlanta, Georgia.

In announcing the national and regional winners for 1976, George

Bagley, NACD president, commented on the high standards set by this year's nominees, adding that these should serve as an inspiration for future projects. The national awards program, initiated 3 years ago, is designed to recognize superior programs and innovative projects by teachers and districts and to encourage stronger efforts in environmental education throughout the nation.

Selection of national winners begins with district and state eliminations, followed by judging at the regional level. From the regional winners a panel of resource specialists and educators determines first and second place national awards.

National Winners

Mrs. Scranton was nominated by Sullivan County (New Hampshire) CD under the leadership of Chairman Arthur Leavitt. She teaches 9th grade environmental studies at Stevens Annex School in Claremont. Her

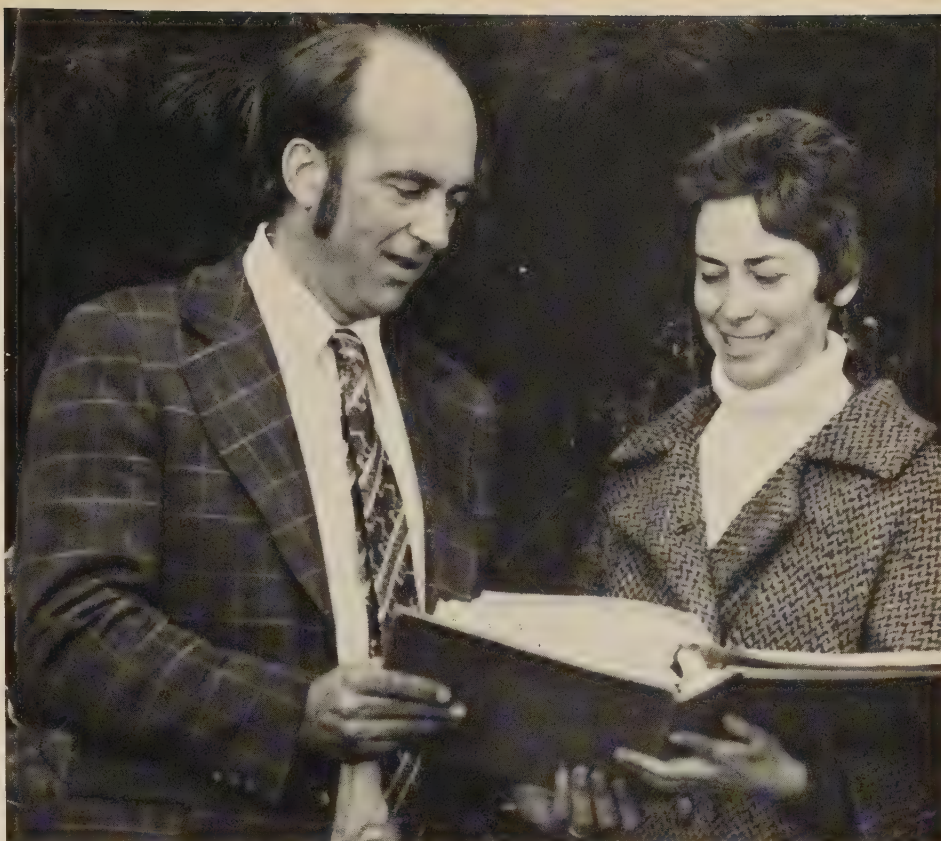
primary objective is to "develop a more conservation-minded citizenry." Mrs. Scranton emphasizes individual responsibility in conservation decisionmaking based on scientific understanding of resource relationships.

An outdoor classroom developed by Mrs. Scranton and her students serves as a learning laboratory for all grades and many disciplines in the Claremont school district.

Mrs. Della McCaughan, national runner-up for Conservation Teacher of the Year, was sponsored by the Harrison County Soil and Water Conservation District (SWCD). Ten years ago she inaugurated a program in marine biology to broaden the scope of environmental studies in Biloxi High School. The program, which focuses on coastal ecosystems and marine life, attracted nationwide attention and has been adopted by several other states. This year Mrs. McCaughan received a citation from National Science Teachers Association for distinguished service to science.

The first-place district, Pontotoc County CD, is chaired by B. M. Stephens. He worked with teachers and district leaders to develop a program that involves elementary to graduate students and includes teacher workshops, curriculum materials development, outdoor classrooms, and adult education. The district employed a former teacher, Dan Sebert, as environmental education consultant to help develop the program. The program is now being extended to schools throughout the state and funded by the Oklahoma Conservation Commission.

Second place district winner, York CD, led by Chairman L. H. Hicks, gave priority to developing land use plans on school property. In a special 1-day project at Clover High School, the district organized community workers and heavy machinery to reshape 110 acres of land into a model school site with an outdoor learning center. A 16mm film, "Now You're in Clover," that resulted from the project, was shown at the 1975 NACD meeting in Hawaii and is now being distributed nationwide. York



Teacher of the Year Lillian Scranton reviews her school's conservation plan with Stan Rastallis, Sullivan County (New Hampshire) CD supervisor.



Pontotoc CD board members B. M. Stephens (left) and Walter Woolley, Jr., visit class that carved jack-o'-lanterns from pumpkins grown in school's new outdoor classroom, one of many developed with the Oklahoma district's help.



A 1-day community project organized by South Carolina's York CD turned 110 acres into a model school site complete with an outdoor learning center.

CD also sponsors an active youth commissioners group that works with elementary and high school classes and has developed a variety of education and information programs.

Regional Winners

The Upper Mississippi Region chose David L. Casteel of Champaign, Illinois, as Teacher of the Year. He was sponsored by Champaign County SWCD, Kenneth M. Kesler, chairman. Casteel teaches an elective environmental science course at Centennial High School in Champaign. He emphasizes "ecologically sane alternatives in solving environmental problems." Casteel, who is chairman of the science department, also advises a student Conservation Club that assists a district-sponsored outdoor classroom used by several schools.

Jasper County Soil Conservation District (SCD), Iowa, was the Upper Mississippi regional district winner. With initial funding from the U.S. Department of Health, Education, and Welfare, Office of Education, the district employed an environmental coordinator, Michael Gross; to prepare environmental teaching units for fifth and sixth grades. The local school district and county officials are now jointly funding this program. District chairman is Gilbert Caldwell.

Southwestern Region Teacher of the Year is Jack L. Anderson of

Littleton, Colorado, sponsored by West Arapahoe CD, John W. Race, chairman. Anderson teaches seventh and eighth grade life science classes at Isaac Newton Junior High School and leads several summer field trips each year.

A joint entry of Blacksmith Fork SCD and North Cache SCD, Utah, won the Southwestern regional district award. The districts featured workshops for teachers and field trips for students. Jay Bankhead is chairman of Blacksmith Ford SCD, and Valden T. Pitcher is the North Cache chairman.

Pacific Region Teacher of the Year is Gerald Stoops, junior high school teacher in San Bernardino. He was nominated by Redlands-Highland-Yucaipa Resource Conservation District (RCD) for his work with students on several beautification projects. Frank Jacinto is district chairman.

Topanga-Las Virgenes RCD, California, is the Pacific Region's winning district. Mrs. Helen Funkhouser is chairman. A large ranch owned by J. Grant Gerson, a district director, has been developed as a summer resident camp and is now an official center for Outdoor Biological Instructional Strategies (OBIS), part of the National Science Foundation program. With district help, an outdoor classroom guide

and a conservation study guide to Tapia Park in Malibu Canyon have been provided for teachers.

The Northern Plains Region chose two Teachers of the Year. Bruce Kron and Larry Stranahan, high school teachers in Havre, Montana, were sponsored by Hill County CD, Leroy Keller, chairman. Their program includes a life science course and a 10-day summer field trip to study various ecosystems in the state.

The Northern Plains regional district winner is the Central Platte Natural Resources Conservation District, Nebraska. The district's environmental education program has three main objectives—a continuing series of teacher training workshops, development of classroom materials, and a planned Educational Television series. John Jefferson is district chairman.

Mrs. Scranton, this year's national Conservation Teacher of the Year, represented the Northeastern Region. The region's winning district is New Castle CD, Delaware. Josef A. Burger, chairman, and other district leaders worked with the Delaware State Department of Public Instruction and the 12 local school districts to develop school-site outdoor classrooms. They established Del Ray conservation clubs in local high schools with the cooperation of the Delaware Nature Education Society. The district also assisted in rehabilitating several urban parks—that had been severely vandalized—with labor supplied by local young people in a combination environmental learning-work project.

South Central Region Teacher of the Year is Mrs. Pat Kellogg of Ada, Oklahoma. She was sponsored by Pontotoc County CD, the national first-place district. Mrs. Kellogg is a sixth grade teacher at Ada Middle School. Her multidisciplinary program emphasizes learning by doing in the outdoor classroom.

Mrs. Della McCaughan and York CD, second-place national winners, represented the Southeastern Region.



Growing corn through a cover crop of brome grass is one of several no-till systems under study by USDA's Agricultural Research Service at Morgantown, West Virginia.

by Hubert W. Kelley

Conservation Tillage: Hazards Ahead?

Scientists and conservationists conferred for a day in Washington, D.C., to explore the virtues and risks—and the riddles—of minimum tillage systems.

I know a farmer in Delaware . . . who turned his back on his corn fields for just a few days—and cutworms ate up 200 acres before he noticed.

Conservation tillage systems are here to stay, but they will require more careful management by farmers than “clean-till” systems.

That was one conclusion of a scientific conference held Nov. 22 in Washington, D.C., to explore the virtues and hazards—real, suspected, and imaginary—connected with minimum tillage.

The meeting was called jointly by the administrators of the Soil Conservation Service and Agricultural Research Service (ARS), with Dr. Harold L. Barrows, ARS deputy assistant administrator, as chairman. It was attended by ARS, SCS, and Extension Service personnel.

In opening the conference, an SCS spokesman said that with more than 39 million acres farmed in 1976 under some form of minimum tillage

system, “it is time we took a hard look at the pros and cons of these tillage systems to determine if any serious environmental problems lie ahead.”

Conservationists are excited about no-till, for example, the SCS staffer said, because it reduces the erosion rate on many soils from 5, 10, or even 20 tons per acre to less than a ton.

“If no-till can be continued on many hard-to-manage soils,” he said, “it will mean that the life of the topsoil can be measured in millennia instead of decades or centuries.”

He noted that reductions in energy use also can be achieved by reducing tillage.

He pointed out, however, that a number of adverse impacts have been attributed to conservation

tillage, including higher insect and rodent populations; higher incidence of plant disease; more runoff of soluble phosphorus; higher herbicide runoff; and delayed germination of seed during cool, wet springs.

ARS scientists representing several disciplines explored the various hazards. Walter G. Lovely cited the need for better crop management.

Allows Few Errors

“Clean-till lets a farmer make the maximum number of mistakes with a minimum impact on yield,” Lovely said. “He can always correct his errors in another trip over the field. But with conservation tillage, he can’t do that. A farmer should understand that if he goes the conservation tillage route, he will have much less room for error.”

Agronomist William Raney agreed. “I know a farmer using minimum tillage in Delaware,” he said, “who turned his back on his corn fields for just a few days—and cutworms ate up 200 acres before he noticed. These new farming systems require



Clean-till lets a farmer make the maximum number of mistakes with a minimum impact on yield. With conservation tillage, he will have much less room for error.

much more careful surveillance than conventional tillage."

Raney believes that researchers need to concentrate efforts on raising crop yields under minimum tillage, "because a farmer won't accept something new unless yields are as high or higher than the old system."

Leon Kimberlin, SCS chief agronomist, pointed out that on many soils there already are good opportunities for high yields with minimum tillage. The 1975 record corn yield of more than 300 bushels per acre, for example, was established with conservation tillage by an Illinois farmer, he said.

Must Control Weeds

Warren Shaw, an authority on weed control, said that total control of unwanted plants is essential to

development of high-yielding farming systems.

Shaw said that chemical weed control is responsible for at least 10 percent of the increase in total farm production since 1940 and insisted "there is no turning back" from the use of chemicals.

"I see no possibility of reducing chemicals in agriculture today," Shaw declared. "The question is not should we use them, but rather how much, how safely, how effectively, how economically." He called fuel savings in using chemical weed control "very substantial."

He said that a no-till cropping system may require from 6 to 11 different herbicides for success today. He added, however, that the best way to control weeds is through an "integrated weed management system" involving not only chemicals but also pathogens, water control, and cultural control.

"I know of no instance where the best mixture of practices isn't better than any single method of control," Shaw explained.

"We must continue to examine carefully herbicide, fertilizer, and other agricultural chemical uses in which risks could outweigh benefits," Shaw said. "When this has been done, using acceptable scientific criteria, if the risks remain questionable, such chemical uses should

be discontinued and replaced with safer alternatives. If such alternatives are not available, researchers should develop them."

All the ARS researchers observed that the chief deterrent to surface residue tillage at present is the farmer's fear that his neighbors will scorn him for having "trash" on his field.

"For many producers," said one researcher, "a clean, well-tilled field is the same thing as good farming."

And Shaw exclaimed: "It's impossible to interest a farmer in no-till when he's just bought a disk as wide as this conference room."

Cuts Soil Losses

Scientists also discussed higher soluble phosphorus levels in runoff water. R. F. Follett said there is no question that soil erosion is reduced on many soils with no-till farming. He cited a 1973 study showing that soil losses totaled 13.1 tons per acre per year on a field of soybeans under conventional tillage. Under a no-till system, soil losses were cut to 0.16 tons per acre.

Total phosphorus in the runoff water also is reduced under a no-till system, Follett said, particularly in phosphorus linked to sediment particles. In a study in northern Mississippi, however, there was an increase in the amount of soluble phosphorus in runoff water. (See table this page.) When the sediment-linked P and soluble P were added together, however, there was a significant overall reduction in phosphorus in runoff in the no-till systems.



Populations of army worms, a serious pest of soybeans, corn, and other crops, appear to increase under minimum tillage and no-till, according to entomologists and farmer observers.

Phosphorus Losses (Pounds/Acre)—1973

Crop	Tillage Method	P in Solution	P tied to Sediment	Total P Losses
Soybeans	Conventional	0.12	15.6	15.7
Soybeans	No-till	1.6	0.9	2.5
Soybeans-wheat	No-till	1.9	0.7	2.6
Soybeans-corn	No-till	0.5	5.6	6.1
Corn-soybeans	No-till	2.0	1.9	3.9

At left, Spalding County, Georgia, farmer Phil Ogletree, Jr., sprays a cover crop of rye with herbicide to kill it before planting corn in the mulch.

The best way to control weeds is through an integrated weed management system involving not only chemicals but also pathogens, water control, and cultural control.

Four explanations were offered for the increase in soluble P on the no-till fields:

1. Additional P applied in double-cropping soybeans and wheat.
2. Lack of sorption of fertilizer P by the soil.
3. Lack of inorganic sediments to sorb P from solution.
4. Leaching of P directly from the crop residues.

Raney said that, in his opinion, practically all of the additional phosphorus came from the last source—the plant residues themselves.

In a discussion of increased insect pest hazards, Robert D. Jackson

noted that there is not much up-to-date entomological research in the minimum tillage area. Much of what is known about higher insect populations on no-till fields, he said, is based on reports of county agents.

Favors Some Insects

But Jackson did not doubt that surface residues were contributing to more insect damage, particularly to corn, and that it would take more insecticides to control the pests in the future.

He reported an increase of black cutworm in no-till corn, particularly when the corn followed a crop of soybeans. Jackson said the cutworm favored low, wet areas and had an affinity for soybean trash.

No-till also favors the seed corn maggot and, to a lesser extent, seed corn beetle. Both are particular

problems during cold, wet springs.

Also a hazard are root aphid and white grubs. Many of the latter used to be killed off when fall plowing exposed them to the winter weather.

The entomologist said that his profession had predicted an increase in wireworm on no-till fields, but feels the threat has not yet materialized. Jackson speculated that the continued presence of persistent pesticides in the soil is holding down the wireworm, but that populations will build up slowly.

Corn rootworms were something of a puzzle, said Jackson. In Ohio, four times as many rootworm eggs were laid in no-till fields as in clean-tilled, but it took four times as many eggs before the same amount of damage resulted. He called the evidence "inconclusive."

He did note, however, that one cultural practice now used for cutting down on corn rootworms is impossible with no-till.

"If we plant corn in visible rows," said Jackson, "we can identify next season where they were and plant new rows halfway between the



In Johnson County, Illinois, no-till corn pushes up through wheat stubble, which serves as a moisture-holding mulch and helps prevent soil erosion.



Chisel plow leaves residue of small grain stubble in Minnesota field. Rough tilling helps keep soil from blowing and reduces the number of tillage operations, thus conserving fuel.

Conservationists are excited about no-till . . . because it reduces the erosion rate on many soils from 5, 10, or even 20 tons per acre to less than a ton.

old rows. Since corn rootworms lay eggs at the base of the plant, we can reduce damage about 60 percent by this simple practice. But with no-till, it's difficult to locate the old rows."

Army worms are another corn pest that is "clearly on the increase in no-till," he declared, "and higher populations of slugs and flea beetles also have been reported."

Jackson said that farmers should be prepared to increase the amounts of insecticides applied to fields if they expect to enjoy the benefits of no-till, but that they should expect more pollution, after heavy rains, particularly when granular pesticides have been applied.

Disease Study Needed

More research also is needed on plant diseases and minimum tillage,

but William M. Dowler said that such research "is always a long-term thing and we never know right away about the results of various new tillage practices. No-till is a new ball game."

Dowler said plant pathologists were "very apprehensive" about the chances of disease on no-till corn, but that so far these apprehensions haven't been realized. Two "minor" diseases of corn have increased—gray leaf spot and leaf spot of corn. Southern corn blight has not proved a problem and stalk rot afflicts more corn in conventionally tilled fields.

Scientists agreed that much more research was needed in the whole field of conservation tillage to supply farmers and soil conservationists and county agents with complete, integrated tillage systems. Lovely

said these systems should include recommendations for all parts of the farming system—not just the soil and water management or energy-saving management aspects.

"If we sell systems to farmers, we'd better be sure we have all the answers they need—not just a partial package," Lovely insisted.

Raney agreed. "We scientists are still guilty of provincialism," he said. "We need to talk to other disciplines much more than we do now."

Conference Speakers

The following scientists, all of the ARS National Program Staff, spoke at the November 22 minimum tillage conference:

William M. Dowler, staff scientist,
Soil, Water, and Air Sciences Staff.

Ronald F. Follett, staff scientist, Soil,
Water, and Air Sciences Staff.

Robert D. Jackson, staff scientist,
Plant and Entomological Sciences
Staff.

Walter G. Lovely, staff scientist,
Plant and Entomological Sciences
Staff.

William A. Raney, staff scientist,
Soil, Water, and Air Sciences Staff.

Warren C. Shaw, staff scientist,
Plant and Entomological Sciences
Staff.

Mr. Kelley is Director, Information
Division, SCS, Washington, D.C.



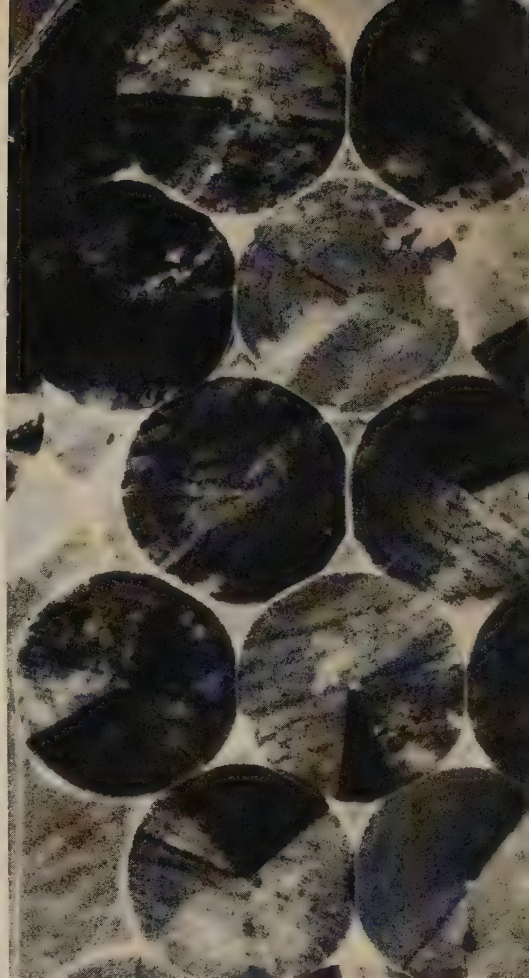
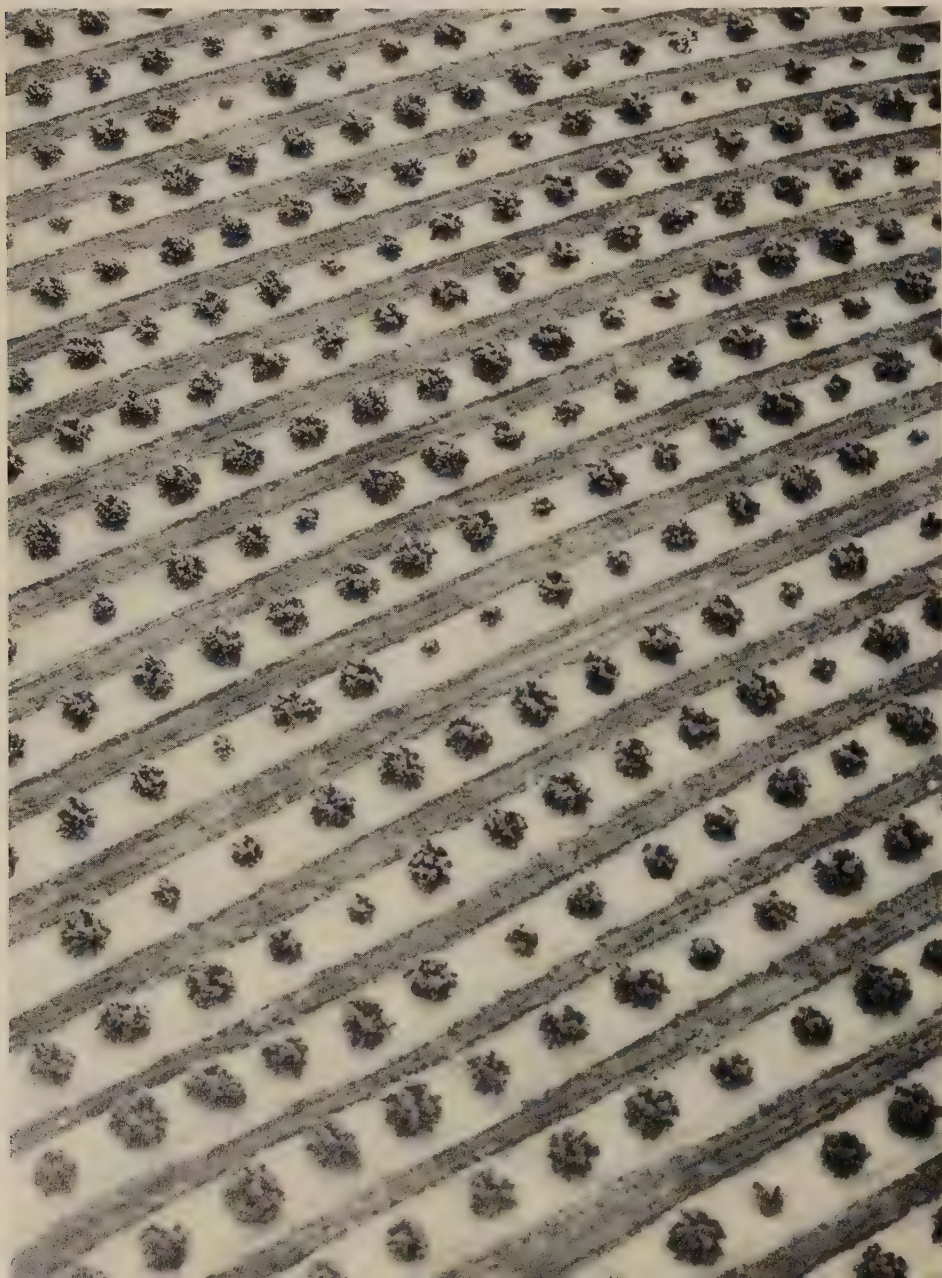
Dr. Orus L. Bennett, an ARS researcher in West Virginia, compares higher no-till corn with adjacent crop grown under conventional tillage. Both crops received same herbicides and fertilizer amounts.

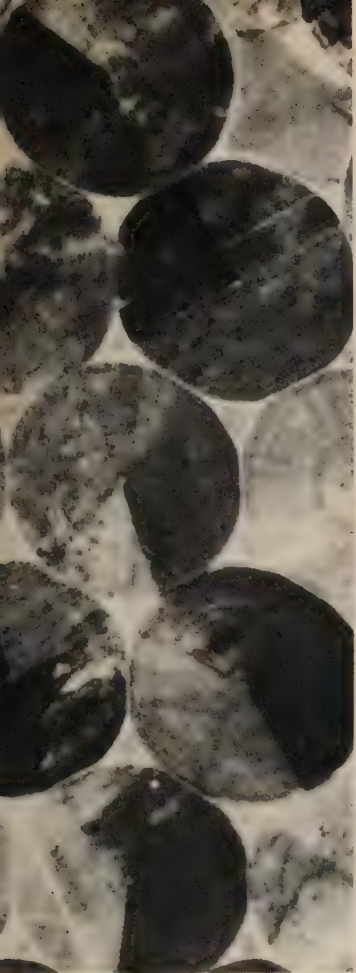
Patterns With a Purpose

From above, the geometric patterns of today's farmland are puzzling to many people. A commercial airline pilot recently asked an SCS neighbor to identify "those big circles on the ground in Nebraska." On the next few pages are several designs on the land—most of which mean conservation at work.

Below, resembling a tufted bedspread, peach trees in New Jersey orchard are separated by strips of clover planted to keep soil from eroding between rows.

At right, water raining down from rotating boom in center pivot irrigation system makes perfect circles of cropland in arid West. Each circle contains 125 acres.



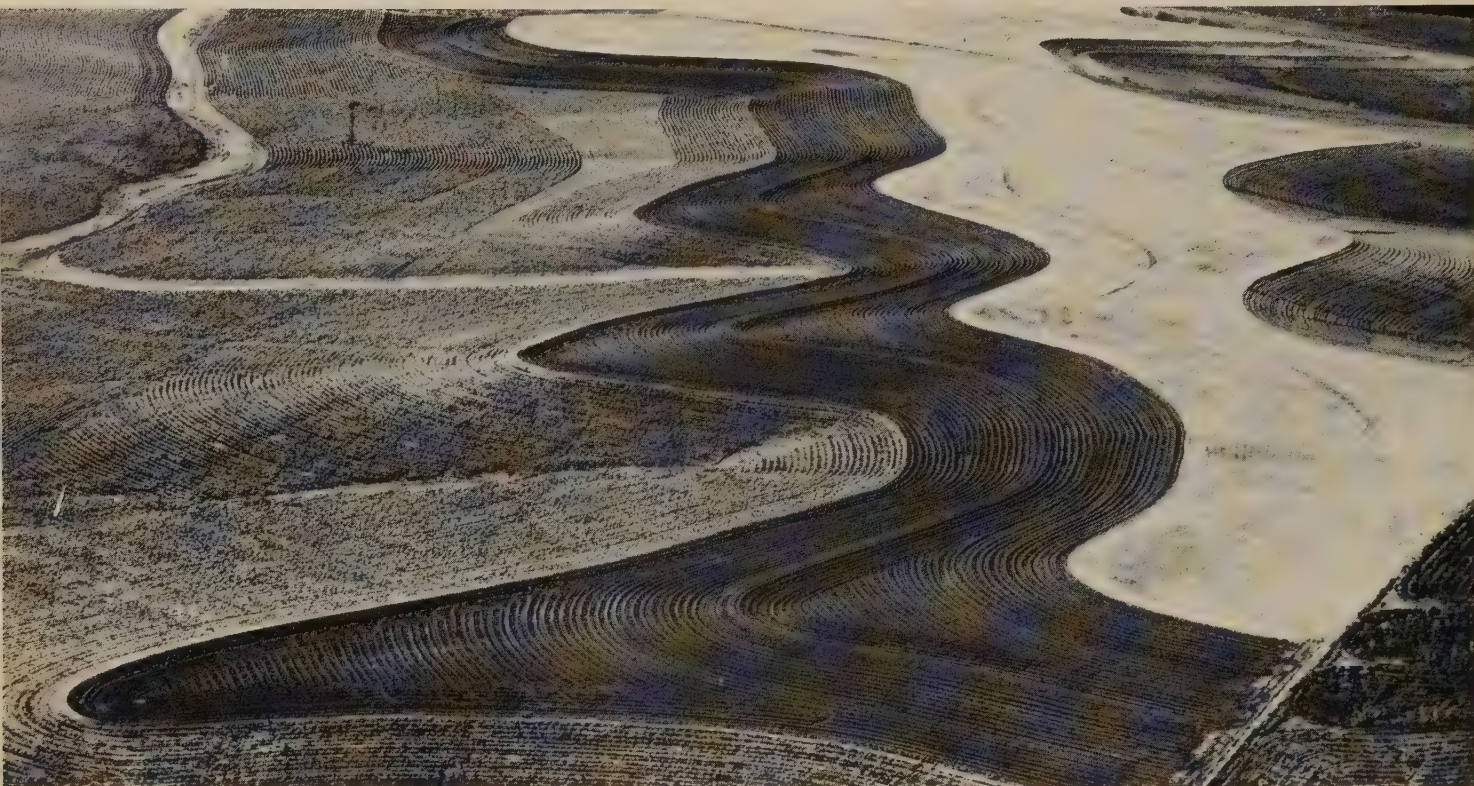


Above, heavy lines show where new underground tile has been laid on Perrydale, Oregon, farm. System will remove excess storm water from fields quickly and safely.

Below, irrigation water will flow down sloping Arizona field between narrow borders. Crisscrossing pattern between borders assures even distribution of water.



Below, in Iowa, rolling fields of corn, soybeans, and small grain are contoured and terraced to trap rain where it falls and to keep soil from washing downhill.



At right, alternating strips of wheat and fallow land are laid out against the prevailing winds on the plains of Montana to reduce soil erosion from wind.

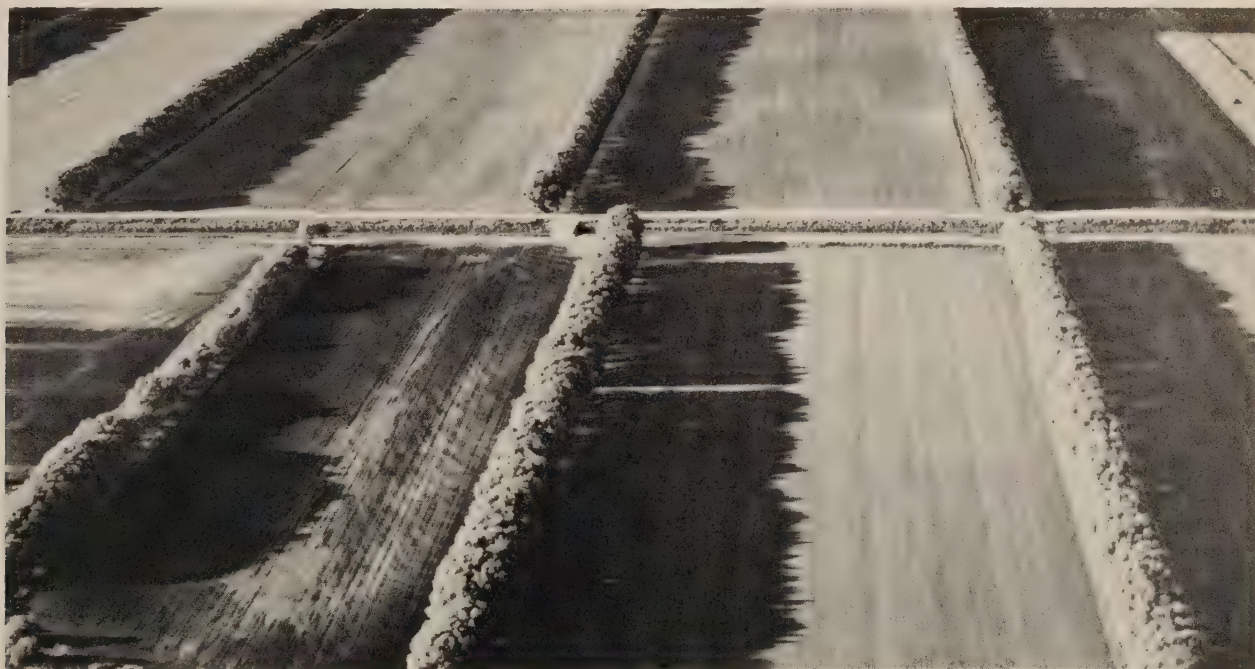


At right, not an aerial view—a glimpse from 4 feet away of strange pedestals of soil left after downpour, each protected from rain by its own umbrella of rock.



Above, parallel terraces, built across the slope of the land on this rolling Texas farm to help prevent soil from washing, can be cultivated with multirow machinery.

Below, on flat farmlands in Michigan, where bluegrass sod is grown, windbreaks of willow trees protect fragile organic soil from blowing until grass comes up.



Banking on Basket Willow

by Wendall R. Oaks



Rapid growth and resilient stems are among characteristics that help make 'Streamco' willow (*Salix purpurea* L.) an ideal erosion control plant for damaged streambanks.

A willow with a new name is finding a new use—as an erosion control plant along streams in the Northeast.

Colonial Americans imported purpleosier willow (or basket willow) from Europe to grow for making baskets. Today the plant has a new name and a new purpose.

The Soil Conservation Service plant materials center at Big Flats, New York, in cooperation with the New York State Department of Environmental Conservation, recently completed tests of the plant for streambank cover—hence the new name, 'Streamco,' an acronym for STREAMbank COver.

'Streamco' is a medium to tall shrub with smooth, slender branches. The branches are purple when young and later change to gray or olive gray. Its narrow leaves are blue green and 2 to 4 inches long.

Rapid growth, resilient stems, profuse suckering, and ability to

recover from mechanical damage make this plant ideal for controlling erosion caused by floods and ice along streambanks.

After tropical storm Agnes ravaged streams throughout the Northeast in 1972, more than 2 million cuttings of 'Streamco' were planted. Survival and growth were good to excellent, with plants reaching 4 or 5 feet in two growing seasons. Mature height (10-20 feet) will be reached in 5 to 7 years.

Either rooted or unrooted cuttings can be used for establishing 'Streamco.' Planting unrooted 'Streamco' is relatively easy: cuttings 9 to 15 inches long and $\frac{3}{8}$ to $\frac{1}{2}$ inch in diameter are collected while the plant is dormant. They are planted vertically, leafbuds pointing up, with 1 to 2 inches exposed.

This limits the number of buds developing into branches and allows the balance of the cutting to develop roots. Where soils are too stony, cuttings are buried horizontally 2 inches deep in damp soil.

Planting failures occur most often when 'Streamco' is planted alone. In many cases, a combination of structural measures, such as riprap, is needed to provide protection until the plantings are established.

'Streamco' is a multipurpose plant that also provides cover for small animals and deer and food for rabbits and beaver.

'Streamco' purpleosier willow has withstood the test of time as it has changed from a basketmaking material to a successful streambank protection plant.

Mr. Oaks is a soil conservationist, Big Flats Plant Materials Center, SCS, Big Flats, New York.



Summary of Activities of the Soil Conservation Service for Fiscal Year 1976

Conservation Highlights

1976

As America's farmers increased plantings to meet production demands at home and abroad, the Soil Conservation Service during fiscal year 1976 stressed the importance of protecting soil and water to meet long-term resource needs.

More than 79,000 new voluntary cooperators signed up with conservation districts during the year ending June 30, 1976, bringing the total to 2,315,005. These include not only farmers and ranchers but also school districts, housing developers, and other public and private land users who are applying and maintaining soil and water conservation practices on 797 million acres of the nation's land.

In giving technical assistance to farmers, SCS professionals recommended varied conservation



practices and systems for preventing soil erosion. Their efforts often were backed by statewide information campaigns.

Minimum tillage, including no-till farming, continues to be the fastest growing conservation practice. It was tried on an additional 2.9 million acres of cropland in fiscal year 1976, for a new total of 39 million acres. The practice conserves energy as well as soil.

The number of parallel terraces, which allow efficient use of large modern farm machinery, increased as well. Some 7,400 miles of parallel terraces were installed in fiscal year 1976, boosting the on-the-land total to more than 100,000 miles.

District cooperators also installed 2.5 million acres of contour farming, 346,690 acres of stripcropping, and 214,894 acres of vegetative cover on critically eroded areas. These practices, along with minimum tillage and terraces, usually were part of an overall conservation system.

Through nearly 3,000 local conservation districts, SCS provided technical assistance to almost 1 million land users during the year. SCS technicians helped prepare more than 62,500 conservation plans covering 23 million acres and helped revise more than 29,000 plans covering 19.5 million acres. Nearly 619 million acres of land in the United States now are covered by conservation plans. With these plans, land users establish conservation systems geared to their needs and the needs of the land for adequate resource protection and wise land use.

SCS technicians also provided onsite assistance to farmers, ranchers, and other land users to make sure that conservation practices were properly designed, installed, and maintained. In fiscal year 1976, SCS provided 2.7 million technical services to land users. SCS also helped some 15,000 groups of land users, such as neighboring landowners or community organizations, with conservation plans and related services.

Conservation Help for Units of Government

SCS employees furnished more than 126,000 services to 30,514 local and state governments during the year. SCS provided basic soil and water data used by local governments in preparing more than 400 regulations concerning land use and control of sediment and erosion. SCS also helped prepare more than 17,000 natural resource inventories and evaluations. Local governments use these to develop quality standards for conservation land use and treatment.

Woodlands and Windbreaks

With SCS technical assistance, landowners planted nearly 258,000 acres of trees, more than 50,000 acres of farmstead and feedlot windbreaks, and more than 2,000 miles of field windbreaks. They prepared 203,909 acres for planting or seeding forest crops and improved another 268,203 acres of woodland. Improved

harvesting was practiced on 905,353 more acres, for a total of 37 million acres nationwide.

Pasture and Range Conservation

SCS helped farmers and ranchers with pasture and hayland plantings on 2.1 million acres during the year, bringing the on-the-land total of improved pasture to more than 77 million acres. They assisted in bringing pasture and hayland management to 9 million acres during fiscal year 1976, for a total of 78 million acres.

In the West, SCS professionals helped ranchers reseed more than 355,000 acres of range, for a cumulative total of 17.7 million acres. They also assisted ranchers in developing planned grazing systems for 6.6 million acres, bringing the total acreage under the systems to 59 million.

Great Plains Conservation Program

During the year, more than 2,000 farmers and ranchers signed long-term contracts to apply permanent conservation measures on 4.2 million acres. Since the program began in 1956, nearly 52,000 farmers and ranchers have signed GPCP contracts covering 94 million acres.

Wildlife

SCS specialists helped landowners improve 12.7 million acres of land and water for wildlife during the year. They also helped landowners convert more than 200,000 acres from cropland and other uses to wildlife and recreation areas. Other conservation measures, such as the 36,000 ponds SCS designed during the year, will benefit wildlife as well.

Recreation

SCS provided technical and financial assistance for establishing or expanding 311 public recreation developments, such as state, county, and local parks. SCS specialists also provided technical assistance to 1,277 landowners establishing or expanding commercial recreation enterprises and to more than 21,000 landowners developing noncommercial recreation facilities.

Water Bank Program

Through the Water Bank Program, SCS provides technical and financial assistance for conserving wetlands in important migratory waterfowl nesting and breeding areas. During fiscal year 1976, SCS assisted land users in preparing 802 conservation plans that support water bank agreements. A total of 3,164 plans covering 1.6 million acres has been developed or revised for water bank agreements since the program was established in 1972.

Water Resources

Small watershed projects under Public Law 566 combine conservation measures on private and public land with

dams and other structural measures to reduce floods and provide water supply, recreation, and wildlife habitat. During fiscal year 1976, 29 small watershed projects were completed, bringing to 425 the number completed since the program began in 1954. Ten projects were authorized for planning, bringing the cumulative total to 1,731, and 33 were approved for construction, for a total of 1,157. Construction began on 17 projects during the year. About 9,400 man-years of construction work and related secondary jobs are now being generated, most of them in rural communities with high unemployment.

Nine river basin studies were completed during the year, including one on which the Chicago metropolitan area floodwater management plans are based. A total of 85 river basin studies had been completed as of June 30, 1976. SCS also completed 29 flood hazard analyses and made 14 flood insurance studies for the Department of Housing and Urban Development.

Under Section 216 of the Flood Control Act of 1950, more than \$10 million was obligated for emergency streambank stabilization, debris removal, and revegetation to protect life and property after storms and floods caused damage in 22 states.

Environmental Services

SCS filed 44 draft and 80 final environmental impact statements with the Council on Environmental Quality during fiscal year 1976. The agency also commented on some 1,000 environmental impact statements from other agencies and cooperated in numerous environmental assessments throughout the nation.

Resource Conservation and Development Areas

Resource Conservation and Development (RC&D) areas are sponsored by conservation districts, local governments, and other public bodies to advance economic development in adjoining counties by enhancing the environment. During fiscal year 1976, 10 new RC&D areas in 10 states were authorized for assistance. This brought the total number of RC&D areas to 168, involving 1,117 counties in all states except Alaska.

Agricultural Conservation Program

SCS assisted farmers and ranchers in preparing 4,167 conservation plans that serve as foundations for long-term Agricultural Conservation Program agreements. The agreements, which run as long as 10 years, provide cost sharing on selected conservation practices. This year's plans cover 2.4 million acres, bringing the cumulative total to 4.2 million acres.

Soil Surveys

SCS leads the National Cooperative Soil Survey. As of June 30, 1976, more than 1 billion acres had been mapped in the United States, Puerto Rico, and the Virgin Islands to show the location and kind of soil.

Nearly 54 million acres were mapped during fiscal year 1976.

A record 101 soil survey manuscripts were submitted for printing during the year, and 88 surveys were published. At the end of the year, SCS had 961 modern published soil surveys covering 466 million acres.

Snow Surveys

In the West, SCS snow surveyors measure the mountain snowpack in winter to estimate how much irrigation water will be available in spring and summer. In fiscal year 1976, snow surveyors took 5,241 separate snow course measurements and issued 2,406 water supply forecasts.

Progress in automation continued during the year. Remote sensing equipment was installed at 100 more data sites, making a total of 260 automated sites. A contractor began installing a meteor burst system for communication between the data sites and computers in western SCS state offices.

National Water Assessment

SCS continued participation in the Water Resources Council's second national water assessment. Studies show projected water needs for livestock, irrigation, and noncentral domestic water systems for the years 1985 and 2000. Upstream flood damage and cropland erosion rates also are projected for the years 1985 and 2000.

Colorado River Basin Salinity Control Program

Under Public Law 93-320, SCS is cooperating with the Bureau of Reclamation to reduce salt concentrations in the Colorado River, primarily by improving onfarm irrigation efficiency. In the first full year of the Title I program, 27 cost-sharing contracts were signed for irrigation improvements on 4,700 acres. Major practices installed included land leveling with laser beam control, concrete-lined irrigation ditches, and structures for water control and measurement. In fiscal year 1976, Title II salinity control studies were underway in four areas covering some 500,000 acres of irrigated land plus thousands of dryland acres.

Plant Materials

Six new conservation plants were released by SCS with cooperating agencies in fiscal year 1976. Among these are the Midwest's first three certified varieties of native wildflowers, which will be used to control erosion and beautify pasture, range, and roadsides. Other new plants will be used for reclaiming surface-mined land, reseeding range, and stabilizing streambanks. More than 126 kinds of improved plants selected or developed by SCS are now produced commercially for conservation or environmental improvement across the country. Programs at nine SCS plant materials centers have been stepped up to meet an increased demand for plants to reclaim land surface mined for coal.

Summary of Progress, Fiscal Year 1976

Reportable progress in soil and water conservation programs assisted by the Soil Conservation Service

Progress Item		Fiscal Year 1976	Cumulative to June 30, 1976
Conservation Plans and Related Services			
District cooperators	No.	79,065	2,315,005
District cooperators	acres	29,500,756	796,771,784
Land users assisted	No.	998,735	—
Services to land users	No.	2,672,533	—
Land users applying practices	No.	532,445	—
Conservation plans prepared	No.	62,524	1,828,542
Conservation plans prepared	acres	23,029,558	618,921,571
Conservation plans revised	No.	29,097	—
Conservation plans revised	acres	19,499,712	—
Inventories and evaluations prepared	No.	91,033	—
Federal lands under coordinated conservation plans	No.	71	1,158
Federal lands under coordinated conservation plans	acres	699,208	17,047,487
Conservation Help for Units of Governments			
Units assisted	No.	30,514	—
Technical services	No.	126,074	—
Land use and treatment data provided	No.	15,830	—
Resource plans	No.	856	—
Inventories and evaluations	No.	17,201	—
Land use regulations using soil and water data	No.	416	—
Sites for public facility, selected	No.	1,056	—
Sites for public facility, investigated	No.	17,566	—
Agricultural Conservation Program			
ACP referrals serviced	No.	216,066	—
Requests for long-term agreements serviced	No.	5,883	—
Conservation plans for long-term ACP agreements	No.	4,167	8,091
Conservation plans for long-term ACP agreements	acres	2,380,556	4,182,086
Long-term ACP agreements expired or terminated	No.	205	335
Long-term ACP agreements expired or terminated	acres	67,350	108,357
Group Conservation Plans and Related Services			
Groups assisted	No.	14,751	—
Conservation plans prepared	No.	3,029	29,018
Inventories and evaluations	No.	4,893	—
Technical services	No.	73,205	—
Groups applying practices	No.	4,292	—

Progress Item		Fiscal Year 1976	Cumulative to June 30, 1976
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Great Plains Contracts

Applications received	No.	2,411	56,236
Applications received	acres	4,996,383	105,893,829
Contracts signed	No.	2,077	51,778
Contracts signed	acres	4,169,569	94,379,441
Contracts terminated	No.	2,487	37,011
Contracts terminated	acres	4,192,790	60,776,459
Cropland before GP contract	acres	419,681	14,136,251
Planned cropland conversions	acres	72,265	2,961,220

Water Bank Program

Referrals serviced	No.	1,319	—
Plans developed	No.	802	3,164
Plans developed	acres	352,276	1,634,581
Wetland treatment completed	acres	64,649	—

Soil Surveys

Detailed soil surveys	acres	43,760,059	910,884,799
Reconnaissance soil surveys	acres	9,769,454	92,665,958
Total surveys	acres	53,529,513	1,003,550,757
Exploratory soil surveys in Alaska	acres	—	352,710,591

Snow Surveys

Snow course measurements	No.	5,241	—
Aerial snow marker course readings	No.	699	—
Mountain precipitation gauge readings	No.	2,019	—
Sites with remote sensing	No.	172	—
River stations for which numerical forecasts issued	No.	690	—
Interpretive water supply forecasts issued	No.	332	—
Statistical forecasts issued	No.	2,074	—

Recreation Development

Land owners and operators: Establishing first commercial enterprise	No.	814	—
Establishing, expanding, or adding to public rec- reation developments	No.	311	—

River Basin Studies

Flood hazard analyses	No.	29	—
Flood insurance studies	No.	14	—
River basin studies completed	No.	9	85

Progress Item		Fiscal Year 1976	Cumulative to June 30, 1976
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Watershed Projects

Applications	No.	22	2,904
Authorized for planning	No.	10	1,731
Approved for construction	No.	33	1,157
Construction starts	No.	17	940
Projects completed	No.	29	425

RC&D Areas

Applications on hand	No.	—	60
Applications on hand	acres	—	264,325,000
Areas authorized for assistance	No.	10	168
Areas authorized for assistance	acres	38,313,000	704,470,000
RC&D measures completed	No.	1,769	10,533

Fiscal Year 1976

Watershed and RC&D Project Measures

		Watersheds	RC&D
Reservoir-type structure sites:			
Investigated	No.	393	129
Surveyed	No.	770	224
Reservoir-type structures:			
Designed	No.	1,082	348
Under construction	No.	1,137	167
Flow control structure sites:			
Investigated	miles	172	57
Surveyed	miles	226	147
Flow control structures:			
Designed	miles	424	111
Under construction	miles	813	155
Fish, wildlife, and recreation developments (public):			
Surveyed	No.	7	11
Designed	No.	17	19
Under construction	No.	18	22
Services provided on land rights, agreements, and contract awards	No.	15,479	2,465

Summary of Progress—continued

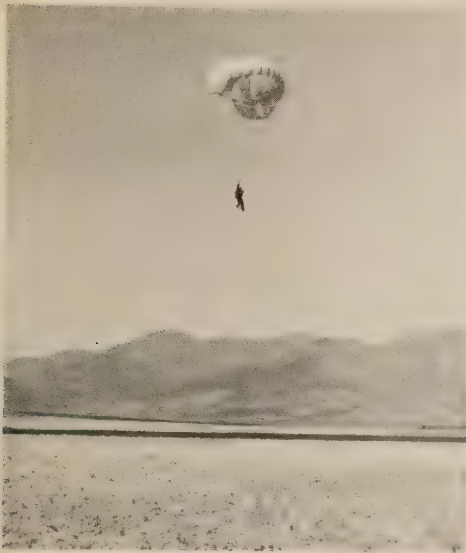
Practice		Fiscal Year 1976	On the land— June 30, 1976
Agricultural waste management systems	No.	1,075	6,877
Agricultural waste storage facilities	No.	742	4,714
Bedding	acres	11,919	1,039,593
Brush management	acres	2,752,595	59,344,377
Burning, prescribed	acres	323,203	7,125,341
Chiseling and subsoiling	acres	710,471	12,938,843
Clearing and snagging	miles	316	9,004
Conservation cropping system	acres	16,176,357	225,065,267
Contour farming	acres	2,544,956	50,010,971
Critical area planting	acres	214,894	5,604,860
Crop residue management	acres	14,850,997	188,590,116
Dams, diversion	No.	948	24,507
Dams, multiple-purpose	No.	164	9,014
Dams, multiple-purpose	acre-feet	81,160	26,345,031
Debris basin	No.	1,930	78,761
Deferred grazing	acres	10,837,464	96,564,019
Dike	miles	152	14,078
Disposal lagoon	No.	730	9,447
Diversion	miles	2,424	105,530
Drainage field ditch	miles	4,158	196,934
Drainage land grading	acres	27,550	670,490
Drainage main or lateral	miles	4,529	388,810
Drain, subsurface	miles	31,156	1,025,238
Farmstead and feedlot windbreaks	acres	50,083	946,325
Fencing	miles	3,978	775,259
Field border	miles	926	50,329
Field windbreak	miles	2,260	101,018
Firebreak	miles	2,259	49,603
Fishpond management	No.	44,901	806,641
Fish ponds, commercial	acres	2,376	81,660
Fish raceways	feet	13,235	470,752
Fish stream improvements	feet	160,630	3,839,152
Floodwater diversions	feet	30,645	2,697,320
Floodwater retarding structures	No.	315	12,703
Floodwater retarding structures	acre-feet	202,788	6,954,473
Floodways	feet	129,651	5,321,382
Grade stabilization structures	No.	13,552	283,104
Grassed waterways or outlets	acres	114,785	2,214,022
Grazing land, mechanical treatment	acres	14,456	1,418,069
Heavy use area protection	acres	11,504	287,152
Hedgerow planting	miles	313	22,623
Hillside ditch	miles	57	1,991
Holding ponds and tanks	No.	852	9,916
Irrigation canal or lateral	miles	191	59,548
Irrigation ditch and canal lining	miles	840	37,528
Irrigation field ditch	miles	974	128,607
Irrigation land leveling	acres	231,292	12,679,235
Irrigation pipeline	miles	4,352	196,498
Irrigation pit or regulating reservoir	No.	1,325	49,418
Irrigation storage reservoir	No.	201	40,524
Irrigation storage reservoir	acre-feet	10,651	9,584,731
Irrigation system, drip	No.	330	1,543
Irrigation system, drip	acres	15,188	65,952
Irrigation system, sprinkler	No.	5,496	164,667
Irrigation system, sprinkler	acres	577,927	12,834,859
Irrigation system, surface & subsurface	No.	5,202	189,152

Practice		Fiscal Year 1976	On the land— June 30, 1976
Irrigation system, surface & subsurface	acres	501,322	20,343,679
Irrigation system, tailwater recovery	No.	1,826	22,784
Irrigation water management	acres	2,838,549	25,859,136
Land smoothing	acres	161,434	8,574,569
Lined waterway or outlet	feet	17,990	422,802
Livestock exclusion	acres	568,478	18,180,060
Minimum tillage	acres	2,874,220	39,161,170
Mulching	acres	42,379	1,338,096
Open channels	miles	348	16,971
Pasture and hayland management	acres	8,771,496	78,098,927
Pasture and hayland planting	acres	2,132,347	77,478,552
Pipeline for recreation or livestock	miles	2,443	47,014
Planned grazing systems	acres	6,579,895	59,077,228
Ponds	No.	35,964	2,093,091
Proper grazing use	acres	45,913,641	287,571,006
Pumping plant for water control	No.	2,715	154,161
Range seeding	acres	355,452	17,736,806
Recreation area improvement	acres	40,802	1,577,031
Recreation land grading and shaping	acres	22,969	545,985
Recreation trail and walkway	miles	374	18,341
Road, access	miles	1,533	41,772
Spring development	No.	2,604	154,303
Stock trails and walkways	feet	158,025	23,440,002
Stream channel stabilization	miles	49	1,344
Streambank protection	miles	287	11,472
Stripcropping	acres	346,690	22,596,628
Structure for water control	No.	57,294	2,097,697
Terrace, basin	miles	232	3,495
Terrace, gradient	miles	10,202	712,377
Terrace, level	miles	9,547	423,421
Terrace, parallel	miles	7,407	100,141
Total terraces	miles	27,388	1,239,434
Toxic salt reduction	acres	49,604	1,779,121
Tree planting	acres	257,554	24,831,773
Troughs or tanks for livestock	No.	8,470	625,552
Waterspreading	acres	30,032	1,284,680
Wells	No.	7,293	659,461
Wildlife wetland habitat management	acres	518,677	8,304,481
Wildlife upland habitat management	acres	12,196,345	90,739,727
Wildlife watering facility	No.	688	42,561
Woodland, direct seeding	acres	8,774	776,845
Woodland, improved harvesting	acres	905,353	36,533,151
Woodland improvement	acres	268,203	18,505,307
Woodland pruning	acres	7,258	3,432,531
Woodland site preparation	acres	203,909	6,897,639

Land Treated

Land protected during development	No.	1,549	19,058
Land protected during development	acres	27,083	473,559
Land adequately treated	acres	24,347,323	—
Land adequately protected	acres	—	1,075,679,850

Touching Down on Conservation



by Soren G. Sabey

The latest fans of soil conservation are sky divers.

Mile upon mile of Cedar Valley, west of Lehi, Utah, is dry-farmed for wheat, hay, and grass. Each year after harvest, the farmers in the area plow half their land under or chisel the soil, leaving crop stubble on the surface to let the soil rest and accumulate moisture.

Sky divers say that the rough-tilled and stubble-mulched fields make a better "cushion" for their "touch down." Jumpers suffer most of their minor injuries when they hit the ground, especially novice parachutists who haven't mastered the perfect "parachute landing fall technique." Plowed fields, they find, are more forgiving than hard ground and cut down on injuries.

Touching down on the "softer" fields brought conservation work to the attention of Jack Atkins, owner of the Cedar Valley Airport Sky Divers facilities. As a result, he requested technical assistance from the Alpine Soil Conservation District in further developing his airport acreage.

Mr. Sabey is a soil conservationist, SCS, Provo, Utah.

Meetings:

January

- 9-12 American Farm Bureau Federation, Honolulu, Hawaii
- 9-13 National Council of Farmer Cooperatives 48th Annual Meeting, San Juan, Puerto Rico
- 10-14 North American Game Breeders and Shooting Preserve Association National Convention, Milwaukee, Wisc.
- 16-19 National Wool Growers Association—National Lamb Feeders Association Convention, Monterey, Calif.
- 30-Feb. 5 American National Cattlemen's Association Annual Conventions & Trade Show, Atlanta, Ga.

February

- 2-5 Catfish Farmers of America, New Orleans, La.
- 6-10 National Association of Conservation Districts, Atlanta, Ga.
- 8-12 American Seed Trade Association, Inc., Garden Seed Conference, New Orleans, La.
- 13-15 Sprinkler Irrigation Association Technical Conference, Salt Lake City, Utah
- 14-18 Society For Range Management Annual Meeting, Portland, Oreg.
- 20-25 American Association for the Advancement of Science, Denver, Colo.
- 22-25 Land Improvement Contractors of America, Orlando, Fla.
- 23-24 Southern Forest Institute, Inc., Houston, Tex.
- 25-28 American Association of School Administrators Convention, Las Vegas, Nev.
- 27-Mar. 5 American Society of Photogrammetry, Washington, D.C.

March

- 5-9 Association for Supervision and Curriculum Development, Detroit, Mich.
- 6-8 The Wildlife Society, Atlanta, Ga.
- 6-9 North American Wildlife and Natural Resources Conference, Atlanta, Ga.
- 20-25 American Concrete Pipe Association Annual Convention, Las Vegas, Nev.
- 21-24 Land Use Planning Symposium, sponsored by Soil Conservation Society of America, American Institute of Planners, American Society of Planning Officials, Council of State Governments, National Association of Conservation Districts, and Urban Land Institute, Omaha, Nebr.
- 21-25 Annual Spring Meeting Hardwood Plywood Manufacturers Association, Cancun, Mexico.
- 25-27 National Wildlife Federation 41st Annual Meeting, Washington, D.C.

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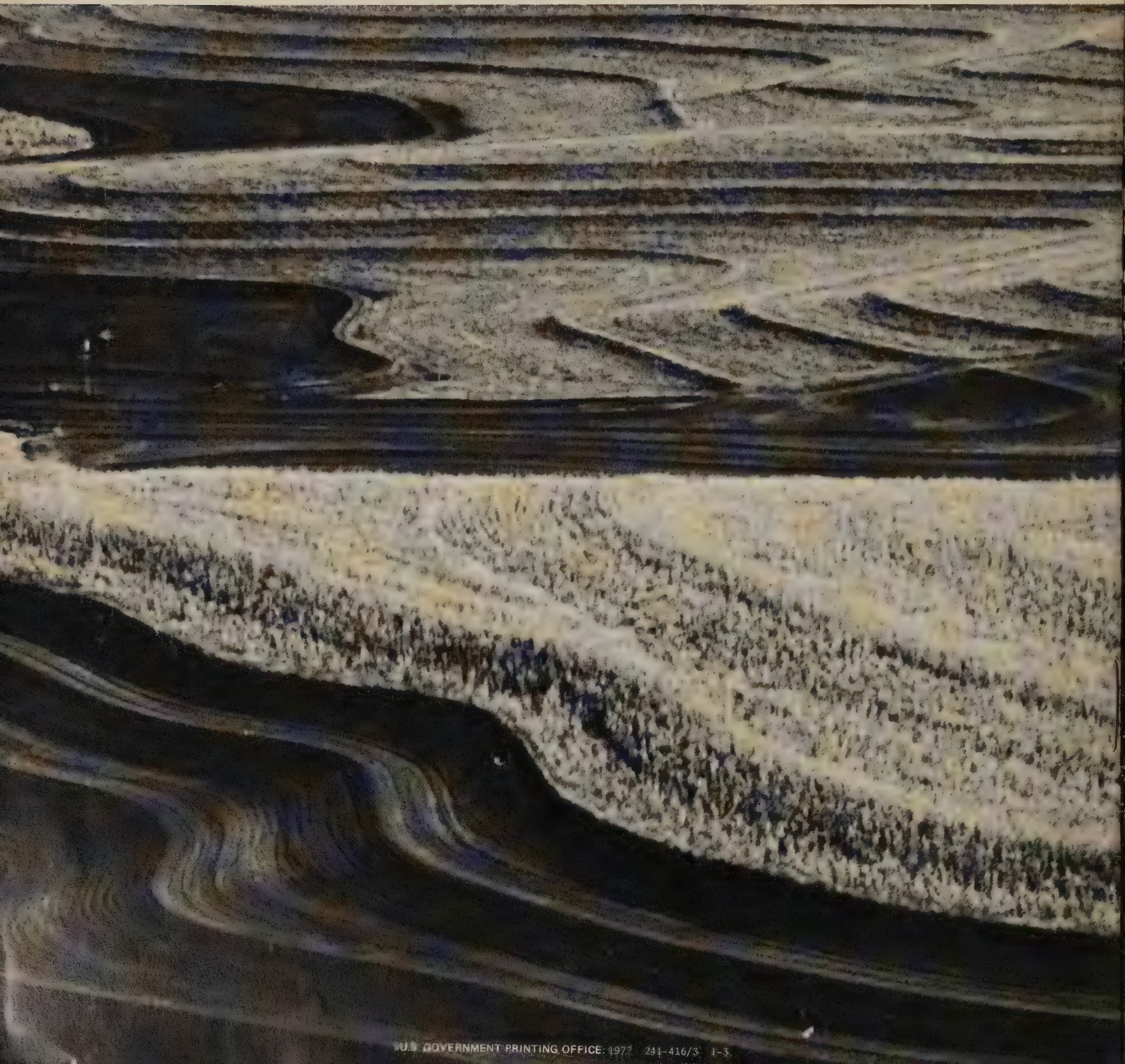


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February 1977

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Trees . . . from the Ground Up

From the Administrator

Most foresters agree that a pinch for wood will be upon Americans by the year 2000, a pinch that will come from an increasing population's demand for more wood products and for the other amenities we expect from a forest land base that is dwindling.


Time passes quickly on forestry's calendar. Trees planted this year will be only half-grown by 2000. Woodland thinnings, improvement cuttings, and other forestry management practices accomplished today will not pay maximum dividends until the turn of the century.

The Soil Conservation Service is in a unique position to help the nation meet future wood needs. For more than 30 years, SCS has been documenting the relationships between soils and wood production potential. Data from nearly 20,000 soil-woodland correlation plots will be in computer storage by the end of this year. The data can help a landowner know which of his soils are most productive—as well as help the nation determine what technical and financial assistance programs can provide the best results for the time and money invested.

Forested lands can be used in many ways to produce varied benefits. Use of soil-woodland interpretations will help answer a multitude of questions. What species are best suited for planting? What is the potential for wood production? Where are the prime forest lands that might best be devoted to intensive use? Which soils would best be reserved for uses other than wood production? What soil-related problems and limitations must be overcome?

Improved forest management requires the close teamwork of many people, beginning with the landowner. It requires not only foresters, but also soil scientists, soil conservationists, plant materials specialists, biologists, and loggers. Better management needs the cooperation of SCS and USDA's Forest Service with state forestry agencies, colleges, and forest industries. It calls for support of conservation districts and their associations as well as of citizen groups.

All of us need to be involved in helping people make sound decisions. In forest management, effects of mistakes are felt for decades.

A handwritten signature in dark ink, appearing to read "R. M. Davis". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

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Bob Bergland
Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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Soil Conservation

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After a tragic flash flood in Charleston, West Virginia, community leaders teamed up to repair damaged hillsides and streambanks—and to look for ways to stop future damage.

The Donnally Hollow Washout

by Dixie L. Shreve



A thunderstorm that "got hung up on some tall hills" south of Charleston, West Virginia, the night of July 9, 1973, poured down more than 5 inches of rain in just 3 hours.

The area is drained by streams flowing through small, steep hollows to the Kanawha River. One of the hardest hit valleys, Donnally Hollow, is so narrow that streets and streams take all the bottom land. Houses are crowded back onto the hillsides.

One Donnally Hollow resident reported that he was awakened by the storm, and peered from his front door into the mist, rain, and blackness. Then, in lightning flashes he saw a washing machine floating across the front yard. He ran to the back door and heard timber falling higher up on the hillside.

Although he and his family safely "rode it out," destruction struck just

a few houses away. An avalanche of soil, trees, brush, rocks, and water hit two nearby houses, washing one from its foundation into the street. Five people were swept from the house, but all survived. A log shot like a battering ram through the back of the other house almost to the front porch. The back bedroom roof collapsed under mud and debris, killing three children.

After the flash flood, the Soil Conservation Service helped the city of Charleston develop a revegetation plan for Donnally Hollow. SCS recommended Kentucky 31 fescue to stabilize the hillsides and streambanks because it is efficient, inexpensive, and readily available. The city limed, fertilized, seeded, and mulched critical areas immediately.

With technical assistance from SCS, the city cleaned debris and

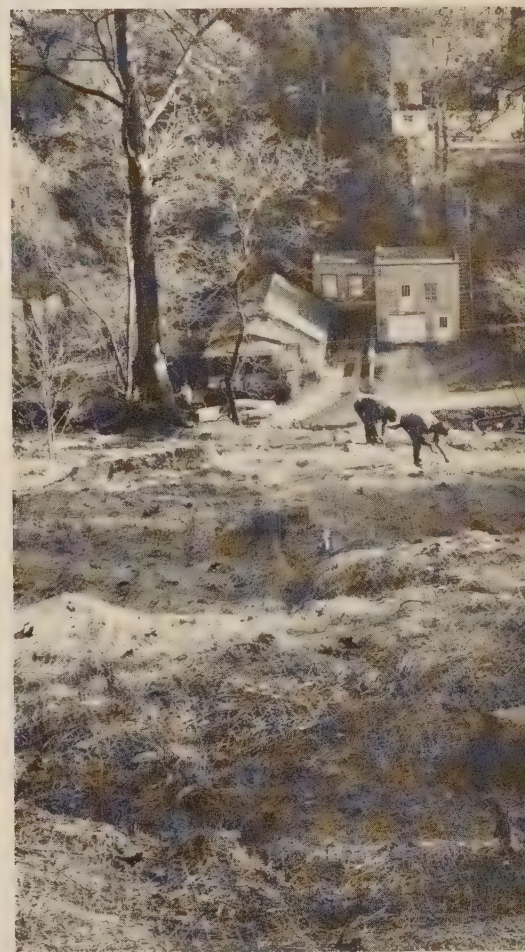
sediment out of Upper Donnally Creek. The city also reworked the storm drainage system in the area, enclosing part of the creek in a storm sewer.

The West Virginia Legislature appointed a special committee to investigate the causes of the Donnally Hollow flood and to recommend action for preventing damage from flash floods on other creeks. At the committee's recommendation, each of the state's 55 counties listed its streams most in need of emergency cleanout. Work has been completed on the first of the high-priority streams.

Mr. Shreve is district conservationist, SCS, Charleston, West Virginia.



Donnally Hollow hours after the flash flood struck—stunned residents survey the damage. Soil, trees, and rocks ripped from hillsides cover the valley floor (at left). Neighbors search for victims in house destroyed by mudslides during the 5-inch, 3-hour-long rainfall (above).



Work crews begin plantings to help stabilize the steep hillsides, one of the first steps in a revegetation plan designed to reduce the danger of severe damage from future heavy rains.



Conservation districts are using state laws and SCS technical assistance in programs to help maintain water quality and to boost grazing and timber production on private woodlands in the Pacific Northwest.

Better Management For Farm Woodlands

by Duane A. Bosworth

Water in Pacific Northwest streams and rivers is cleaner, and grazing and timber production are up—largely because of improved conservation management on privately owned woodlands.

New state laws and conservation district programs are focusing attention on the need for good woodland management on small farm forests in Washington, Oregon, Idaho, and northern California. These small woodlands, along with Pacific Northwest commercial forests, account for nearly half the timber going into houses throughout the United States.

The new state laws carry various titles, but all deal with forest-cutting practices. They are designed to assure that timber cutting, hauling, and replanting are planned as a conservation package that results in minimal soil erosion and improved water quality.

Because erosion control is so important in Forest Practice Acts, local conservation districts and the Soil Conservation Service are receiv-

Expanded woodland conservation efforts help cut down the amount of sediment that enters Pacific Northwest streams.



Oregon farmer constructs water bars to lessen the chance of erosion on firetrails through his woodland.

A combination of conservation measures used on Al Deishl's Washington tree farm (right) nearly eliminates soil erosion during harvest.

"Since the campaign started 6 years ago, lots of defeatist talk about forestry has turned into predictions for a sunny future."



ing increasing numbers of requests for technical assistance in seeding road cuts, controlling water runoff, and designing haul roads and trails to keep erosion from getting started.

In Washington, two recent developments affect farm woodland operations.

One is a new property tax assessment system for the state's 4.8 million acres of small farm forests. The soils on which these trees grow are being mapped, classified, and judged by SCS and state-employed soil scientists. When the job is completed by 1980, each acre will be taxed according to its capacity for producing wood.

In many instances, small woodland owners will pay much less than under the present tax system that bases assessments on the land's market value. At harvest time, however, owners will pay a yield tax.

"A result of the delayed tax program," said Bob Olson, SCS forester for Washington, "is incentive to undertake exactly those things—

planting, fertilizing, thinning, and careful harvesting—that produce topnotch trees."

The other development affecting farm woodlands in Washington is the Forestry Practices Act that went into effect in January 1975. The act requires that erosion-control practices for logging operations be planned before skid trails or access roads are established. A Forest Service study has shown that logging roads can generate up to 95 percent of the sediment that results from logging operations on some Pacific Northwest soils. If roads are properly designed and laid out, however, sediment can be reduced to almost nothing, the study concluded.

Al Deishl, who has a 1,200-acre tree farm near Spokane, has developed a plan calling for a combination of conservation measures that nearly eliminates erosion during harvesting. He leaves a buffer zone of trees straddling small streams to slow bank erosion. Water bars across skid trails control water runoff, and fire

suppression lanes help protect from fire damage.

The Forest Practices Act requires that each plan be approved by the Washington Department of Natural Resources. The state's Department of Ecology and Department of Fish and Game also review logging plans for operations that could affect salmon migration streams.

The changes in state law have encouraged Washington farmers, timber managers, and loggers to step up requests for technical assistance from SCS and the districts.

In Oregon, the forestry committee of the Upper Willamette Resource Conservation and Development area has initiated a campaign to help small woodland owners. The committee put together a booklet that shows how conservation management can make farm forestry profitable. To help prove the point, the committee arranged tours for small woodland owners to show well-managed operations on woodlands similar to their own. The committee also published

“Woodland conservation practices that improve grazing conditions for livestock also dramatically improve fish and wildlife habitat.”

Planned woodland management after a fire is resulting in increased ruffed grouse numbers in this Douglas fir stand.



a booklet on specific practices for controlling soil loss on skid roads.

The forestry committee reached nearly all 8,000 owners of farm woodlands in the four-county area. Former committee chairman Sam Konnie notes that since the campaign started 6 years ago “lots of defeatist talk about forestry has turned into predictions for a sunny future.”

SCS plant materials specialists at Corvallis, Oregon, are looking for grasses that can prevent devastating washes and gullies on skid roads. Three years of plant materials testing on 200 acres of woodland sites has produced new and effective erosion-control plants.

Near the coast, where annual rainfall is 60 inches or more, ‘Marshfield’ big trefoil is proving effective for protecting logging roads and road cuts. SCS field trials are underway to see whether the plant could be used for reseeding logged or burned areas to create a temporary cover until new trees are well established. ‘Marshfield’ big trefoil has an added

benefit: It is a food favored by deer and elk.

In the 30-inch to 60-inch rainfall areas where Douglas fir dominates, tests show that ‘Cascade’ birdsfoot trefoil is better suited. It often is planted with intermediate and pubescent wheatgrass. This grass-legume combination forms a sod that is effective in reducing soil erosion.

One benefit of both ‘Marshfield’ and ‘Cascade’ trefoils is that they stay green throughout the summer. Both are fire-resistant and create barriers to ground fires when seeded along old skid roads.

The Corvallis Plant Materials Center now is releasing a variety of dwarf English trefoil called ‘Kalo’ that also has shown great potential as a soil-stabilizing plant.

Idaho, like Washington, has enacted a Forest Practices Act. The act encourages reforestation, stream protection, proper slash disposal, protection of scenic areas, and erosion control during logging. Owners of small woodland tracts usually can

meet erosion control requirements of the Forest Practices Act if their conservation plans include good woodland management.

To accompany the Forest Practices Act, conservation districts in northern Idaho have launched an information campaign to encourage owners to thin their woodland stands. Thinning opens overcrowded timber stands, allowing more sunlight to reach the understory and providing room for more rapid tree growth.

Most farm woodlands are grazed in the Idaho cattle country, even where grass is sparse and trees are spindly and crowded. Through newspaper and magazine articles, SCS and conservation district leaders are advising stockmen that thinning practices can more than double grass and tree production.

There are nearly 3 million acres of small, private woodland tracts in northern Idaho. Nearly half this acreage needs thinning, according to Dave Poe, SCS area forester.

Nick Ormonde and Warren Smith,

One aim: providing alternatives to the "quick and dirty" harvest on steep slopes with unstable soils.



each operating 640 acres in Idaho's panhandle, use their woodlands for grazing.

"Historically, woodland grazing and tree growth have gone on with little or no thought about any kind of management," said Ormonde. "Today, with the need for increased efficiency in agricultural production and anticipated shortages in wood fiber, we need better woodland management efforts."

A small trout stream, Lancaster Creek, runs through both farms. The water is crystal clear and stays that way, although trees are logged in the area almost daily.

Smith and Ormonde help prevent erosion and subsequent sedimentation by constructing logging roads on gentle grades and installing proper drainage. They revegetate bare areas with a mixture of adapted grasses and legumes. Attractive log bridges provide access across Lancaster Creek, and metal culverts carry small creeks under logging roads.

Ormonde uses a cable-logging



Conservation districts throughout the Northwest have developed woodland programs to assist farmers in planning restocking needs after harvest (top photo) and to provide technical help for thinning (bottom) and other management efforts.

"A result of the delayed tax program is incentive to undertake exactly those things—planting, fertilizing, thinning, and careful harvesting—that produce topnotch trees."

"Woodland grazing and tree growth have gone on with little or no thought about any kind of management. Today, we need better woodland management efforts."



SCS plant materials testing shows 'Cascade' trefoil (above) ideal for protecting road cuts.



A well-managed Douglas fir stand in Oregon is typical of small, private woodland operations in the Northwest.

system to winch trees onto logging roads; Smith uses a rubber tire skidder. Both systems minimize damage to the logging sites.

Smith and Ormonde remove trees damaged by insects or disease and trees of poor quality, leaving growing room for the larger, more vigorous trees. They thin stands of young trees that have no commercial value, clean up all slash, and use the smaller trees for making posts.

Ormonde points out that good forestry practices also benefit livestock by increasing grazing capacity. "An unmanaged stand of timber grows slower and has little grass and few shrubs on the forest floor," he said. "A natural stand requires more than 40 acres to support a cow for one month. I've found that a well-managed stand requires only 10 acres for one cow per month."

Both landowners divide pastures and woodland into grazing units so they can rotate livestock, resting each unit once every 4 years until plants reach maturity.

"Grazing must be managed in a planned system to control soil erosion, prevent soil compaction, and keep undesirable plants from coming in," said Ormonde.

"And woodland conservation practices that improve grazing conditions for livestock also dramatically improve fish and wildlife habitat," Smith added.

In California, two-thirds of the state's privately owned forest acres are small woodland tracts owned by 30,000 individuals. Woodland operators have organized as the Forest Landowners of California, an association that represents the owners in decisions implementing the state's 1973 Forest Practices Act.

Working with the Forest Landowners of California, conservation districts and SCS are providing technical assistance to hundreds of woodland operators. One is Wayne Miller, president of the organization, who operates 1,700 acres in Mendocino County.

Through a long-term agreement

with his conservation district and SCS, Miller has had a commercial logger harvest his timber on 50 selected acres for each of the last 2 years. A strict contract with the logger covered all aspects of erosion control, spelling out specific requirements for skid roads, haul roads, stream crossings, and disturbed area seeding.

Other small woodland owners in Mendocino County used SCS and district assistance in constructing 12 miles of erosion-resistant access roads that will serve 10 future logging operations. Constructing the roads bared 32 acres of cuts and fills, but these were reseeded according to SCS standards and specifications for critical areas.

Mr. Bosworth is Head, Field Information Unit, SCS, West Technical Service Center, Portland, Oregon.

An SCS soil scientist and a soil conservationist see hope for a new, resource-poor West African republic through better soil and water management.

Mission to The Gambia

United States conservationists continue to share their experience and expertise with developing nations. Last October, William M. Johnson, SCS deputy administrator for technical services, and R. Neil Sampson, soil conservationist, visited a small West African country called The Gambia. Their mission: to help the Gambian Department of Agriculture set up a soil and water conservation program. A republic since 1971, The Gambia is a ribbon-shaped nation consisting largely of the Gambia River and its bottom land. It stretches 292 miles from the Atlantic Ocean, but averages only 13 miles in width. Per capita gross national product is about \$140 a year.

The average Gambian in this agricultural nation will have to rely on better conservation and farming practices if he is going to improve his standard of living very much, since he has no resources except his soil and water. The best Gambian soils, reports Johnson, are moderately productive, but much of the country is low-lying, poorly drained, and swampy. Grass and timber resources are being overused because of increasing population. Monsoon rains frequently bring severe floods to the lowlands.

But Johnson and Sampson found that, despite these handicaps, an active agricultural extension service in The Gambia is teaching villagers agronomy, crop rotation, and disease control. Many farmers already have advanced from tillage by hoe to tillage by a team of oxen, a major step forward. Farmers also shift cultivation at intervals to improve soil fertility and commonly practice intercropping. The SCS team found that the best hope for a nation like The Gambia lies in a steady improvement in its agriculture and careful conservation of its remaining natural resources.

Village children, including a boy wearing Joe Namath's number 12, form part of an expanding Gambian population expected to reach one million by the year 2000, double the present number of inhabitants. The diet of the current population already is short of protein.



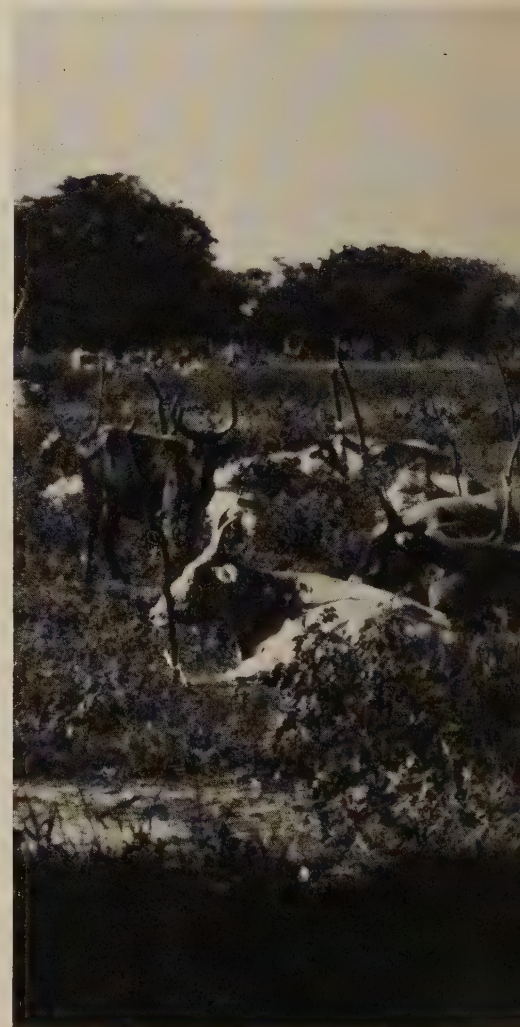


At left, capital of The Gambia is Banjul, on the Atlantic Ocean. Corrugated iron roofs are typical of the better buildings of the small republic; many village homes have thatched roofs. Gambian exports amount to about \$25 million, nearly all of it from the sale of peanuts. Except for one small peanut oil mill, there is no industry in the country.

At right, Gambian men assemble on a woven mat at a meeting place under a tree at the center of the village to hear a representative of the Gambian Department of Agriculture. Land is owned by the state but is distributed for farming to village men by the local chief. Seed peanuts and superphosphate come from the government; crops are sold back to the government. The right to use land for farming is a village birthright.



Above, one has his choice of taking a ferry or rowing his own boat to cross the Gambia River, which is as wide as 8 miles at its mouth. There are no bridges across the river within The Gambia.



At left, saline water is a growing problem among Gambian farmers, since storms may drive salt water 50 miles or more up the Gambia River. When salt water backs into rice fields, yields fall off sharply.





Patches of eroded soil are clearly visible from the air, pointing to the need for a soil conservation program in the new African republic.



Above, farmers welcome roving herds of cattle and their herdsmen as mobile fertilizer units. Boys stake out cattle at intervals in fields until enough manure has dropped in the area. Then they move the stakes to a fresh area. Cattle stick around until grazing is exhausted. Cattle are N'dama, an indigenous breed that is tame, docile, and resistant to local insects and parasites.



A large Gambian village includes a Muslim mosque at the center of town, a number of better homes and buildings, and many round adobe huts with thatched roofs. Farmers walk to fields that surround each village, much as Europeans did in Middle Ages. There are no motor vehicles in the town.



Millet, a staple of the Gambian diet, often grows as high as 12 to 14 feet in soils recently wrested from forest. Rice is also a staple, but unlike millet and peanut acreages, rice fields are allotted to women, following them when they marry.



A boy guides oxen in plowing a field, which will become infertile after 4 or 5 years and be allowed to revert to forest. Traditionally, the land was left in trees for 20 years to rebuild soil fertility. With new population pressures, however, many villages are clearing forests after as little as 5 years, a practice that will mean lower crop yields.

When this North Dakota farmer noticed that wildlife was vanishing from his farm, he began work to bring back the animals. Windbreaks and farm ponds have helped do the job.

Welcome Back, Wildlife

Grass strip planted along multiple-row windbreak offers additional cover, food, and nesting sites for a variety of wildlife.



During the past decade, the wildlife population on Albert Schwenk's farm has doubled. And the North Dakotan says he will not be surprised if it doubles again in the coming decade.

Schwenk and his 2 brothers run a 2,100-acre farm in Hebron, Dunn County, that supports 100 head of Hereford cattle and yields a rich harvest of wheat, corn, oats, and barley.

"But for me, cattle and grain never have been enough," Schwenk explained. "About 10 years ago, I noticed a decline in the number of wild animals that had lived on this land for as long as I could remember. So, I decided to apply conservation practices that would improve wildlife habitat. Believe me, it's been worth the time, the money, and the effort."

It is the Schwenk brothers' extensive work with windbreaks and farm ponds that have given wildlife a

helping hand. They planted 15 acres of trees—single and multiple rows of Russian olive, plum, and American and Siberian elm.

"The shelterbelts provide food and cover for all kinds of wildlife," Schwenk said. "Now we have plenty of deer and rabbits, ring-necked pheasants, partridges, ducks, and grouse. Occasionally, we even see an antelope."

The trees also reduce soil erosion in nearby fields, and cause snow to distribute fairly evenly rather than in windblown drifts.

"Dual purpose planning" is the term Schwenk uses to describe his balanced efforts to save soil and to improve wildlife habitat.

Soil and water conservation is not new to the Schwenk brothers. They have been Dunn County Soil Conservation District cooperators for 30 years, and their wildlife efforts have

won them the North Dakota Wildlife Habitat Award for Dunn County.

Schwenk knows "word" travels fast in the animal kingdom. His several farm ponds attract large flocks of migratory wild ducks just before the mating season.

"Ducks never came here before we had the ponds," he said. "Now they come by the hundreds. They nest and raise their young in the grasses that surround the ponds. It's satisfying to know that our work and planning have paid off," said Schwenk.

"To see wild ducks overhead . . . to know that rabbits and ring-necked pheasants find shelter on my land—I can't measure the value of those things in dollars and cents."

Mr. Schmidt is district conservationist, SCS, Bowbells, North Dakota.

When a new power plant was built in Maryland, its sophisticated construction needs dictated a sophisticated sediment control plan to protect the Chesapeake Bay.

by Hagner R. Mister
and Katherine Gugulis

Sediment Control on the Banks of the Bay

Life in Calvert County, Maryland, is almost as easygoing as it was in colonial days. Yet, this historic county on the Chesapeake Bay is the site of one of the most elaborate sediment control systems in the nation.

In 1972, when Columbia LNG (Liquefied Natural Gas) Corporation built a plant at Cove Point, it also put into operation a sediment control plan that has prevented tons of soil from damaging the bay and a nearby freshwater marsh.

Tony Trubisz, resident engineer at the Cove Point facility, said company officials were somewhat dismayed when they discovered they were required to prepare such a plan for their 1,022-acre site under the Maryland Sediment Control Law of 1970.

Company officials contacted the, Calvert Soil Conservation District (SCD) and the Soil Conservation Service for technical assistance. SCS recommended erosion and sediment control measures tailored to Columbia's unique needs.



The plan saved money, according to Cove Point's engineer. "Post-construction cleanup and maintenance problems would have cost us more than the sediment control measures did."

Columbia converts liquefied natural gas imported from Algeria back to a vaporous state and then pipes it to Loudon County, Virginia, for distribution. At Cove Point, the liquefied gas is transported from an offshore dock for processing and storage in four tanks, each capable of holding 375,000 barrels of liquefied gas.

As part of a series of agreements with the Sierra Club, Columbia constructed an underwater tunnel to the offshore dock—instead of a proposed mile-long trestle—to preserve the area's scenic appeal. Heavy insulation keeps the dock, tunnel, and storage tanks at a temperature of minus 260 degrees Fahrenheit to keep the liquid natural gas from vaporizing.

"More than 1.5 million cubic yards of soil were moved during construction of the storage area alone," said J. Arthur Bowen, district manager of the Calvert SCD, "but virtually none of that soil reached Chesapeake Bay."

Runoff was contained by a 1.5-mile-long drainage ditch system that encircled the storage tank area. The drainage ditch was linked by concrete channels to five sediment basins in the construction area. After sediment settled in the basins, the clarified water was discharged into the bay.

To lay the bed for the tunnel, a channel was excavated in the bottom of the bay. Following technical advice provided by the Calvert SCD,

Columbia constructed a 30-acre pond into which the dredged spoil was pumped and allowed to settle. The technique kept spoil and saltwater out of a nearby freshwater marsh, which the company will turn over to the Maryland Department of Natural Resources for an environmental study area. After construction is complete, Columbia plans to maintain the pond for wildlife.

"We found that the sediment control plan saved us money," Trubisz said. "The post-construction cleanup and maintenance problems would have cost us more than the sediment control measures did."

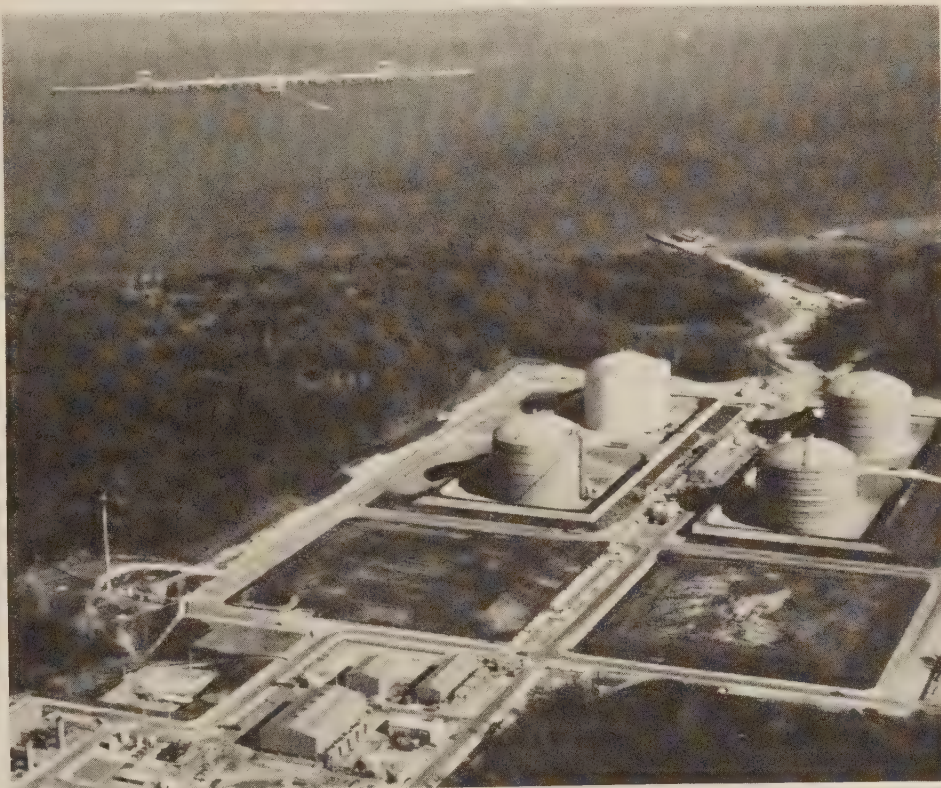
More important, according to Bowen, Columbia's plan helped protect the bay and marsh during the power plant construction.

Mr. Mister is a soil conservationist, SCS, Prince Frederick, Maryland.

Ms. Gugulis is public information officer, SCS, College Park, Maryland.



Columbia Engineer Tony Trubisz (left) and Hagner Mister examine cinder blocks that help slow down the runoff as it travels to sediment basin.



Underwater tunnel connects offshore dock to Columbia LNG Corporation's completed storage tank area. Each of the four tanks can store 375,000 barrels of liquefied natural gas.

Soil is kept out of nearby bay during construction work (at left) by a series of drainage ditches, channels, and sediment basins that encircle the site.

Grass Makes Less Work for the School Nurse

by Morris Gillespie

School grounds in Cleburne County, Alabama, are more attractive and useful after recent conservation efforts. And school officials are finding them safer as well.



Pleasant Grove is one of Cleburne County's five public schools—all with recent grounds improvements designed to control runoff water and reduce soil erosion. Each school is carrying out a conservation plan developed with help from SCS.

"This is the first time children in this school have had anything but rocks and red clay to play on. We used to have at least one injury a month caused by children falling from play equipment onto the hard ground and rocks. But, we've had no injuries since we put down grass and 8 inches of pine bark," according to Rudy K. Payne, principal of Pleasant Grove Grammar School in Cleburne County, Alabama.

The new grass is just one of the conservation measures recently added to the grounds of all five Cleburne County schools. The effort was sponsored by the Coosa Valley Resource Conservation and Development area and the Cleburne County Board of Education.

Superintendent of Schools Bill Ayers signed a cooperative agreement for each of the schools with the Cleburne County Soil and Water

Conservation District (SWCD) and worked with Soil Conservation Service district conservationist Troy Bradford in developing a complete conservation plan for the grounds of each school.

Work began on Pleasant Grove's playground in the spring of 1973. The county road department filled gullies, smoothed the area, and developed diversion terraces and grassed waterways. Concrete sidewalks were built in areas of heavy traffic where grass would be difficult to maintain. Headwalls, flumes, and curbs were installed to carry runoff water.

Bermudagrass was seeded on the play fields, centipedegrass was sodded in shady areas, and sericea lespedeza was planted on a very steep, severely eroded area where grass could not be established.

Students planted 1,000 shrubs

donated by the SWCD. The State Department of Conservation, through the Alabama Forestry Commission, gave several species of plants for wildlife food and cover.

"In the past, the grounds stayed so muddy that the children couldn't play on them for a week after a big rain. Now, they can go out within one day," Payne said.

Ayers said he would recommend such a project to any school with similar playground problems. "Last year, for the first time, we kept the grounds mowed, and we will keep them fertilized and mowed from now on. It has brought about community pride and a close working relationship between school officials and community and county leaders."

Mr. Gillespie is public information officer, SCS, Auburn, Alabama.



It's a rough-and-tumble world at recess. A combination of grass plantings and strategically located bark mulch patches has cut Pleasant Grove's injury rate to zero.

Rudy Payne (left) and Troy Bradford check plant growth on slope protected by new diversion terrace.

Used to Be Just Wishful Thinking

by Nevin Ulery

What once was a 100-foot-high heap of black coal refuse now is a flourishing community park. A small town's first federal grant helped finance the transformation.



Before work began, the top of the coal refuse "mountain" is marked by the beginnings of gullies—cuts that widened and deepened as the material washed into streets, storm sewers, and a nearby creek.

Three decades ago, a 7-acre pile of black coal refuse sat squarely in the center of Cokeburg, Pennsylvania. It was 100 feet high. Today it is the nucleus of Cokeburg Community Park—an 18-acre playground, ball park, and picnic area.

How did the local eyesore turn into a local asset?

In 1902, the Ellsworth Collieries Company—now part of Bethlehem Mines Corporation—built Cokeburg as a coal "company town." Ellsworth located the new settlement in a rich coal field 25 miles south of Pittsburgh.

Coal was the community's economic lifeblood for more than 40 years. By 1927, Cokeburg's population had grown to 1,700 people, many of them proud, hard-working immigrants from eastern Europe.

During the mining "boom years," a small mountain of black coal refuse accumulated in the center of the



Today, there's a new place for games, picnicking, and other recreation activities. Residents are planning to construct additional facilities to make the new park an even more useful community asset.

The 100-foot-high refuse heap dominates the center of a 1946 view of Cokeburg (right, above), a "company town" that just had been turned over to residents by the coal company. A look 30 years later (right, below) shows no sign of the 26-acre pile—gone to make way for a community park.

community near the mine shaft entrance. By the early 1940's, the coal supply was exhausted, and the refuse pile was 100-feet high.

At this point, the company decided to turn the town over to its residents. The company installed a water supply reservoir, two water storage tanks, and sewer lines, and paved the streets. In 1946, it sold the houses for \$1,000 each.

Six years later, in 1952, residents raised \$400 to do something about the coal refuse pile. But that wasn't enough to make much of a dent in the pile.

During the next 22 years, what was left of the refuse heap began eroding, and sediment choked storm sewers. Gullies 10 feet deep and 6 feet wide slashed across the face of the huge pile. Large volumes of sediment accumulated on Franklin Street, located just below the refuse heap. Other masses of sediment reached Pigeon

Over 22 years, the massive pile eroded—sending sediment into streets, storm sewers, and streams.

Creek, which already was highly polluted by drainage from other sources.

By 1974, concerned Cokeburg residents filed an application for assistance from the Penn's Corner Resource Conservation and Development area. A plan to stabilize the pile was prepared with technical assistance from the Soil Conservation Service.

Work included grading 2 acres and installing 2,156 feet of tile drains, 947 feet of diversions, 192 feet of open channel, 712 feet of stone-centered waterways, and two debris basins. Lime, fertilizer, and seed were applied to 13 acres.

SCS, through the RC&D program, and Cokeburg shared the \$18,000

project cost. It was the first federal grant money ever spent in Cokeburg, according to Borough Council President Mike Megles. Under a Department of Housing and Urban Development grant, another baseball diamond and other recreation facilities will be established within the park.

"The RC&D measure was the 'starter' for us," noted RC&D Council Chairman Frank Malinzak. "Completing the stabilization work made it practical to go ahead with projects we used to consider just wishful thinking."

Mr. Ulery is resource conservation and development coordinator, SCS, Monessen, Pennsylvania.



First Impressions of a Farm

by Gene Warren

A Future Farmers of America special project is bringing a touch of farm life to hundreds of Louisiana elementary school students.



FFA chapter members team up with small groups of third-graders as the students find out why different soils are suited for production of different crops.

Ask a third-grader in Crowley, Louisiana, what happened in school today, and you may hear: "I touched a sheep. I rode a horse. I pulled up a radish. And I saw a tractor moving. When the tractor dug up the ground, the soil smelled good."

Discovering some of the realities of farm life firsthand is a standard part of the curriculum for third-graders in this south Louisiana community.

The 2-year-old venture is sponsored by the National Future Farmers of America Foundation as part of its "Food For America" project. Its aim is to show children where their food comes from. In Crowley, the organizers are older students—FFA chapter members at Crowley Senior High School.

Grace Brown's third-grade class at South Crowley Elementary School was the first to take advantage of the youth project.

"It's one of the finest experiences our children have in school," Mrs. Brown said. "Most people assume that children come in contact with farm animals and food crops. But more than half don't. It is impossible to overestimate the value of their direct, sensory experience. A child who pokes through soil to find the roots of a vegetable, confronts a cow face-to-face, smells a barnyard, and sits at the edge of a pond to watch ducks is not likely to forget the experience."

"Our aim is simple," said Lester Turner, an agriculture teacher and



A visit to the chapter's greenhouse offers a chance to compare plant growth under varied test conditions.

FFA adviser at the high school. "We want to share the land and its resources with the children."

Tommy Faulk, an FFA member, explained: "We talk about the problems that farmers have, about the many types of farming, and what happens to crops after they leave the farm. The children also learn about conservation measures that protect soil from erosion."

The demonstration farm is divided into two parts. Two acres, behind the high school, are used for a vegetable garden and greenhouse. Nearby, there are 10 acres for sheep, beef and dairy cows, geese, turkeys, rabbits, and a pond for fish and ducks.

Through the Acadia Soil and Water Conservation District, the Soil Conservation Service made a special soil survey on the farm. The soils information is shared with the visiting children.

"At first glance, it might seem that soils data is a little too sophisticated for children," Turner said, "but, it isn't. They're interested to learn that some soils shrink and swell and that some are better suited for certain crops than others."

All 400 of Crowley's third-grade students are being included in the "Food For America" project this year.

Mr. Warren is public information officer, SCS, Alexandria, Louisiana.

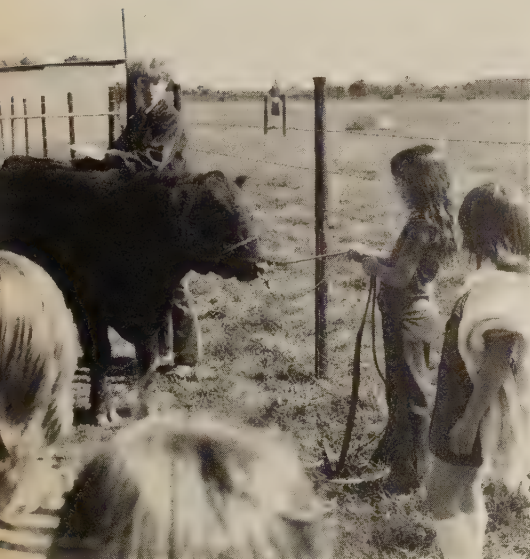
Meetings:

March

- 5-9 Association for Supervision and Curriculum Development, Detroit, Mich.
- 6-8 The Wildlife Society, Atlanta, Ga.
- 6-9 North American Wildlife and Natural Resources Conference, Atlanta, Ga.
- 20-25 American Concrete Pipe Association Annual Convention, Las Vegas, Nev.
- 21-24 Land Use Planning Symposium, sponsored by Soil Conservation Society of America, American Institute of Planners, American Society of Planning Officials, Council of State Governments, National Association of Conservation Districts, and Urban Land Institute, Omaha, Nebr.
- 21-25 Hardwood Plywood Manufacturers Association, Annual Spring Meeting, Cancun, Mexico.
- 25-27 National Wildlife Federation, Washington, D.C.
- 28-
Apr. 1 Ninth Recreation Management Institute, sponsored by The National Park Service, The Department of Recreation and Parks, The Texas Agricultural Extension Service, The Agricultural Experiment Station, College of Agriculture, Texas A&M University, College Station, Tex.
- 30-31 Air pollution Control Association, Washington, D.C.

April

- 3-5 American Pulpwood Association, Atlanta, Ga.
- 3-6 National Water Safety Congress, Twenty-seventh Annual Meeting, Memphis, Tenn.
- 6-8 Engineering Geology and Soils Engineering Symposium, Pocatello, Idaho
- 11-16 International Agricultural Plastics Congress, San Diego, Calif.
- 23-28 American Society of Planning Officials, San Diego, Calif.
- 24-27 Association of American Geographers, Salt Lake City, Utah



Getting close to farm animals for the first time is an opportunity sometimes approached with a little caution.

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March 1977

U. S. Department of Agriculture

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When water means money . . .

From the Administrator

The threat of critical water shortages this summer in the West is drawing attention to the SCS snow survey program. Our water supply forecasts are making headlines nationwide.

With a budget of less than \$3 million, the snow survey program generates benefits of more than \$40 million to irrigated agriculture alone—a real return on the taxpayers' dollars.

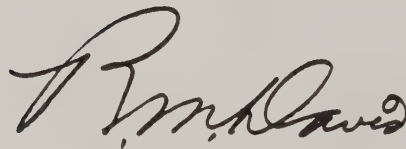
The forecasts also have proven valuable to flood control and municipal water supply agencies, reservoir operators, power companies, recreation enterprises, industries, and fish and wildlife managers. We need to communicate with more of these water users—to let them know how they can get and use water supply forecast information.

For decades snow survey data have been gathered manually. Snow surveyors had to visit high-mountain sites on skis, snowmobiles, or helicopters. Measuring snow depth and water content was more than a little dangerous in many locations.

SNOTEL, our automated data collection system, will eliminate time-consuming manual data collection on the most hazardous snow courses. The system combines automatic measuring equipment and a revolutionary meteor-burst communications technique. Scheduled to go into operation next winter, SNOTEL will provide faster, more accurate data more often on which to base our forecasts.

Although we are noted for our forecast accuracy, we can and will do better. A 10-percent improvement would save water users millions of dollars. We expect SNOTEL to improve overall accuracy by 20 to 30 percent.

As we collect and interpret facts about snow over the winter, we will continue to sharpen our ability to estimate how much water it will produce as it melts in spring and summer. We will work to help more land and water users make wise decisions that will protect resources, property, food and fiber production . . . and people.

A handwritten signature in black ink, appearing to read "R. M. Davis". The signature is fluid and cursive, with the first letters of each word being capitalized and prominent.

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Bob Bergland
Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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Cover:

More than 70 percent of the West's water supply flows from mountain snowpack. New communications techniques will speed forecast information to farmers and ranchers. See story, page 11.

Soil Conservation

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Changing the Face of the Texas Plains



Texas ranchers are turning to a new type of grazing system that increases forage, cuts labor, and offers wide flexibility in management.

by Anne Zack



Foreman Jim Morrow, District Conservationist Harvey Kahlden, and C.O. Richards check kleingrass pasture (above) grazed under a short duration system on the Chadbourne Ranch. Short duration systems also can produce more and better forage on native Texas range (at left).

Across the Lone Star State, short duration grazing systems are transforming depleted, mesquite-infested rangelands into lush rolling plains.

More than 400 Texas ranchers have adopted short duration grazing systems, also called High-Intensity, Low-Frequency (HILF) systems, during the last 5 years. Texas acreage managed under planned grazing systems jumped from 2 million to 10 million during that time, largely because of the increase in short duration grazing.

What is short duration grazing? How does it work? And why is it becoming so popular?

Simply put, the system involves grouping livestock into a large herd that is rotated through a series of pastures. Each pasture receives a brief, intensive grazing followed by a much longer rest period.

"We think of ourselves as going back to the way designed by nature," explained C. O. Richards, executor of the 27,000-acre Chadbourne Ranch south of Abilene. "Buffalo practiced a form of intensive grazing. The whole herd would graze one place and then drift on."

The number of pastures in short duration systems generally ranges from 4 to 12. Cattle on the Chadbourne Ranch, for example, are divided into six herds of 300 to 400 head. The herds are rotated through six management units of eight pastures each. The pastures range in size from 350 to 700 acres.

George, John, and Franklin Halsell have developed a somewhat different short duration grazing system for their 13,000-acre ranch northwest of Fort Worth. Their cattle are grouped into a single herd of more than 1,000 head and are rotated through six pastures of 1,800 to 2,000 acres each.

Grazing and rest periods for each pasture are flexible, based on the kind and amount of available forage and on the condition of the cattle.

"The minute you start setting a definite time to change pastures, you're asking for trouble," said S. E. Kinder, foreman of the Halsell Ranch. "We may change pastures after 15 days or wait as long as 45 days, and we generally have a 4- to 6-month rest period. But we always leave enough grass in a pasture so if fire or some

"We think of ourselves as going back to the way designed by nature. Buffalo practiced a form of intensive grazing. The whole herd would graze one place and then drift on."

Chaining or other types of brush control are necessary steps in some range improvement programs.



other disaster strikes another part of the ranch, we can change the rotation and use it again immediately.

"And we watch the cattle. They start bunching near the fence when it's time to move. If you leave a cow in a pasture too long, she'll go into stress," he added. Stress results when food declines to the point it no longer meets the animal's requirements. The cow then diverts nutrients from her own body to produce milk for her calf.

"You have to temper target dates with observation," Richards agreed. "Our target date for moving cattle is 21 to 25 days to break the brucellosis cycle." Brucellosis bacteria from an infected cow rest on the ground for 28 days before they can infect other cattle, which pick them up while grazing. Changing pastures before any bacteria can become viable helps control the disease. The bacteria usually die before the pasture is used again.

Flexibility to meet specific management objectives and respond to unexpected situations is only one advantage of short duration grazing systems. Increased forage production is another.

"In 1969, we could only run about 900 head of cattle—that's only one cow to 25 or 30 acres," said Richards. "Now we have one cow to every 10 acres because of the increase in forage."

Richards also reports an increase in the amount of desirable grasses in the pasture. "If you put one cow on 1,000 acres," he explained, "she develops a taste for 'ice cream' plants. Those plants eventually disappear because they're grazed out, and less palatable plants take their place.

"By concentrating cattle, however, we force them to eat 'meat and potatoes' as well as 'ice cream.' Then when we move the herd out of a pasture, the 'ice cream' has a chance to



Leaving unplowed strips of brush provides shelter for cattle and habitat for wildlife.

John Halsell and S. E. Kidder inspect seedheads on indiangrass, a valuable native range plant that is making a comeback under short duration grazing.



"Range management is the most important part of our reclamation program. To do all the other parts without range management is just throwing money away."

come back along with the less desirable grasses."

Although cattle are moved more often than in other planned grazing systems, short duration systems require less labor.

"Labor?" Kinder grinned. "This system cuts our labor in half. We only have to drive to one pasture instead of several to check the livestock."

"We do have some problems with short duration systems," Kinder continued. "One difficulty we had was that calves would get separated from their mothers when we moved the herd from one pasture to another."

"We solved this problem by not bunching the cattle when it's time to change pastures. We just open the gate and let them work their way in. The mother brings her calf along. In a couple days, we round up the stragglers and close the gate."

Design and implementation also can

be problems in a short duration system.

"A complete inventory of existing forage resources and physical resources such as watering facilities, fences, and working pens is essential," according to Gary Westmoreland, SCS range conservationist. "This information, in turn, must be matched to the climate of the area and to the rancher's own objectives and constraints."

Westmoreland helped the Halsells convert their four-pasture deferred-rotation grazing system to a short duration system in 1973. The Halsells have been cooperators with the Upper West Fork Soil and Water Conservation District (SWCD) for more than 30 years. They began using planned grazing systems in 1959 when they signed a Great Plains Conservation Program contract.

"The Halsells made this short duration system work for them," said Tony Dean, SCS district

conservationist at Jacksboro. "Many ranchers who run into little problems use them as an excuse to drop the system. But the Halsells made adjustments in the system and adjustments in their operation and it's working out real well. Any planned grazing system has to be adapted to the specific ranch."

On the Chadbourne Ranch, short duration grazing began as part of a range conservation plan developed in 1969 with help from SCS and the Extension Service. Richards took over the ranch that year and became a cooperator with the Runnels SWCD.

Richards plans to continue renovating 70 percent of the range and leaving 30 percent in brush strips or patterns. The brush protects cattle in severe weather and provides habitat for deer, turkey, quail, and doves.

Richards' renovation plan calls for chaining, root plowing, and tandem discing to prepare a seedbed. Then the pasture is seeded, mostly with kleingrass, by air. This work is followed up by a planned range management program that includes short duration grazing.

About 15,000 acres have been renovated so far, but forage production is picking up and palatable grasses are increasing on the native range as well because of the short duration grazing system.

"Range management is the most important part of our renovation program," Richards said. "To do all the other parts—the chaining, root plowing, discing, and seeding—without range management is just throwing money away."

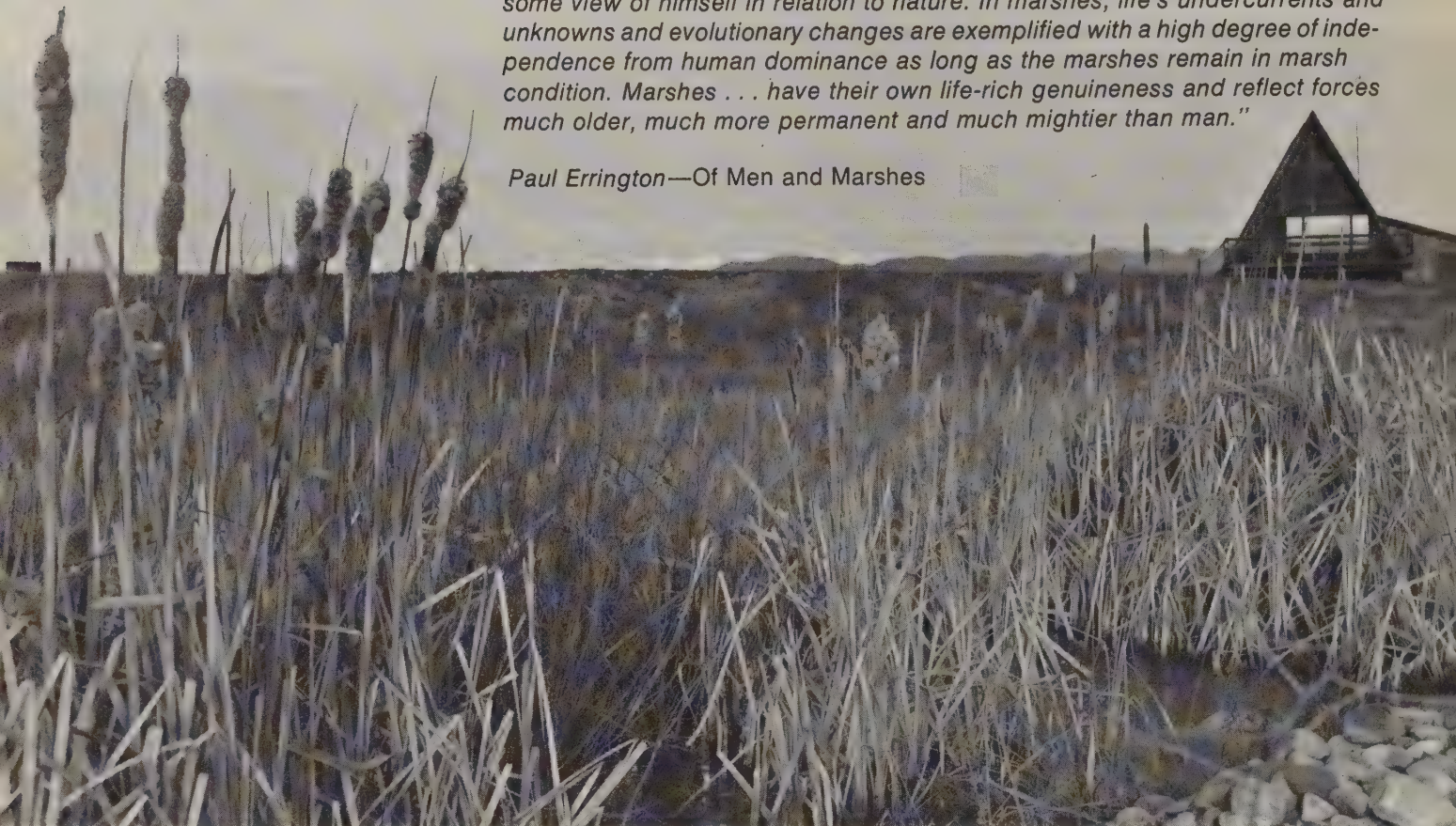
Ms. Zack is a staff writer, Information Division, SCS, Washington, D.C.



Planned grazing systems are designed to prevent overgrazing which results in brush infestation and bare areas that are susceptible to wind erosion.

"Greater familiarity with marshes . . . could give man a truer and more wholesome view of himself in relation to nature. In marshes, life's undercurrents and unknowns and evolutionary changes are exemplified with a high degree of independence from human dominance as long as the marshes remain in marsh condition. Marshes . . . have their own life-rich genuineness and reflect forces much older, much more permanent and much mightier than man."

Paul Errington—Of Men and Marshes



A county government and a graduate student joined forces to transform an unsightly gravel mine in suburban Boulder, Colorado, into a wildlife sanctuary that would have made Thoreau smile.

From Mess to Marsh

by Eldie W. Mustard

As its name implies, Walden Ponds is not your typical gravel pit area. Boulder County, Colorado, is reclaiming the surface mine for a marshland wildlife refuge in the midst of suburbia.

The red fox has settled here and rears its young. Mule deer pass through the wetland habitat, and puddle ducks (mallards, teal, pintails) and Canada geese thrive here. The transformation from mined pits to marshlands took careful planning. But Wally Toevs and Claudia Toburen never doubted it could be done.

Three years ago, Toevs, a Boulder County commissioner, decided the mined-out pits could become a community asset. He enlisted the aid of Toburen, a graduate student in wildlife biology at Colorado State University.

Toburen created a wildlife development plan for the 130-acre surface mine as a project to help fulfill requirements for her master's degree. She received financial support from the county and guidance from the Resources Development Internship Program of the Western Interstate

Commission for Higher Education (part of the National Bicentennial Intern Program).

In developing her wildlife conservation plan, the young biologist tapped the technical knowledge and skills of many agencies, including the Soil Conservation Service, Colorado Division of Wildlife, and Colorado State Forest Service. SCS and the Boulder Valley Soil Conservation District published the plan, and Boulder County hired Toburen to implement it.

An early step in carrying out the plan was to shape excavated areas into the shallow ponds that now have developed into marshes. Migratory water birds share the shallow-water sanctuary with various birds of prey, rodents, insects, and a host of other aquatic and terrestrial creatures.

The perpendicular sides of excavated areas presented a problem. They were too steep to be revegetated, and they were unsafe—especially near water. Most of the banks were graded down to gentle slopes, but some were left for bank swallows. These birds use vertical banks for building nests and rearing young in condominium-style communities where they are safe from predators.

One pond was deepened and stocked with rainbow and brown trout. Because of its proximity to the city of Boulder and easy accessibility by car, it is reserved for fishing by senior citizens and the handicapped.

Several Boulder community groups are helping with the wildlife project. Audubon Society members have identified 134 different species of birds at Walden Ponds. On a snowy, blustery day last March, a local Bluebird chapter of the Campfire Girls of America brought wooden bird-houses to the wildlife sanctuary and helped fasten them to fenceposts.

The wildlife development plan for Walden Ponds is ongoing. The county still mines roadbuilding gravel in the area, but now topsoil is stockpiled. It will be spread over disturbed surfaces to hasten revegetation when mining is finished.

Mr. Mustard is state biologist, SCS, Denver, Colorado.



Claudia Toburen and Park Ranger Nancy Lucero plant grass, shrubs, and trees along marsh edges to provide food and shelter for a variety of wildlife.



Canada geese are among the more than 130 species of birds that have been seen in the new marshland area.

Beach Clinics Draw Crowds

At "beach clinics," North Carolina waterfront property owners are learning how to fight erosion with plants.

Soil Conservation Service employees along North Carolina's coast are gearing up for another summer of "beach clinics." As many as seven clinics are conducted each summer to demonstrate the use of beach grasses, shrubs, and trees on waterfront property.

Both erosion control and beautification are clinic topics. People attending learn what plants to use, generally native shrubs and beach grasses tested at SCS plant materials centers. They also learn proper planting and maintenance methods.

About 70 people attend each clinic; some return year after year.

Karl E. Graetz, former SCS plant materials specialist at Raleigh, started the clinics 4 years ago. Sid Dronen, who succeeded Graetz, now conducts the program with assistance from SCS district conservationists in coastal counties. Other environmentalists help, including experts from North Carolina State University and county government officials, nurserymen, and private citizens concerned with coastal conservation.

The day-long clinics start with a workshop held in a city hall, fire station,

or other convenient building. The workshops include displays of living beach grasses and shrubs, talks, slide presentations, and discussion periods.

Copies of a publication Graetz authored, "Seacoast Plants of the Carolinas for Conservation and Beautification," and other brochures are distributed to participants.

A 2-hour tour starts after lunch. It generally includes a half-dozen stops—some where erosion problems can be seen firsthand and others where plantings have transformed problem areas into well-protected, well-landscaped sites.

Most of the clinics are held along the state's southern coast, between the South Carolina border and Cape Hatteras, but requests are increasing from areas farther north on the Outer Banks.

Since North Carolina has more than 3,200 miles of coastline—including ocean front, sounds, bays, and estuaries—those who conduct the sessions expect popularity of the "beach clinic" approach to expand each year.

Mr. Jeter is public information officer, SCS, Raleigh, North Carolina.



Beach clinic participants visit frontal dunes recently planted with American beachgrass. Raised walkway helps protect dunes and plants.



Samples of plant materials suitable for beautification and erosion control get careful study during clinic.



Meteor trails will be used to reflect VHF radio waves as part of a new snow survey program called SNOTEL, the world's first full-scale meteor burst data transmission system.

SNOTEL: Wave of the Present

Radio signals bouncing off trails blazed by tiny meteorites soon will be speeding snow and rainfall data to Soil Conservation Service offices in 10 western states.

by Manes Barton

Farmers and ranchers will be getting water supply forecasts in record time when an innovative radio transmission system links remote mountain snow survey sites to Soil Conservation Service offices in the West.

Called SNOTEL, for "snow telemetry," the new system relies on the billions of sand-sized meteorites that enter the atmosphere every day. As

each particle heats and burns in a zone 50 to 75 miles above the earth's surface, its disintegration creates a cigar-shaped trail of ionized gasses.

Though the ionized trails are ephemeral, their several milliseconds to a few seconds of life provide enough time to reflect VHF radio signals from ground points up to 1,200 miles apart. SCS's master collection stations at

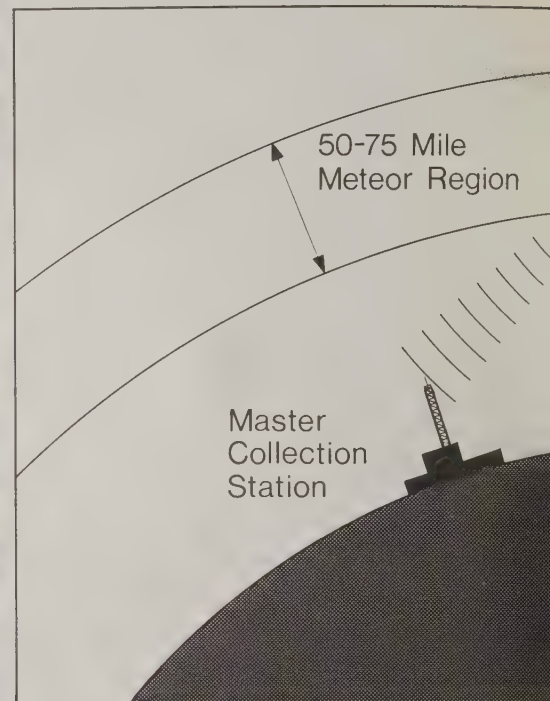
A precipitation gage (right) is one of the sensors that will provide current information about conditions at each automated snow survey location.



Bare snow pillows at typical SNOTEL site are fenced to protect from damage by wild animals. Weight of fallen snow creates pressure on pillows that indicates snow's water content.



SNOTEL will link ground stations up to 1,200 miles apart by bouncing signals off short-lived meteorite trails high above the earth.



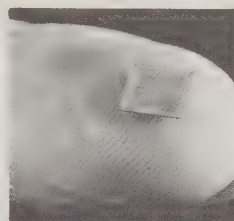
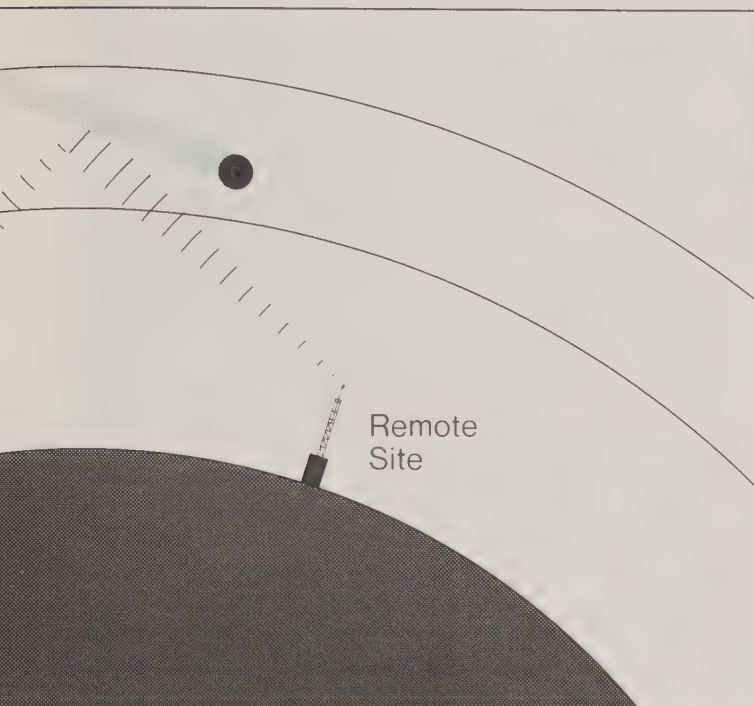
Boise, Idaho, and Ogden, Utah, will be equipped to probe the skies for meteor trails suitable for relaying data.

Radio signals will be beamed from the two stations to bounce off the trails and down to any of the remote sites located in the Cascade, Rocky, and Sierra Nevada mountain ranges. The reflected signal will trigger a small radio at the selected remote site which then will broadcast current snow survey data along the same short-lived route. The complete transaction will take only a fraction of a second.

Data then will be forwarded by telephone lines from the master collection stations to a computer at the SCS West Technical Service Center in Portland, Ore. Snow survey supervisors in 10 western states will be able to obtain minutes-old information from the computer via terminals located in SCS state offices.

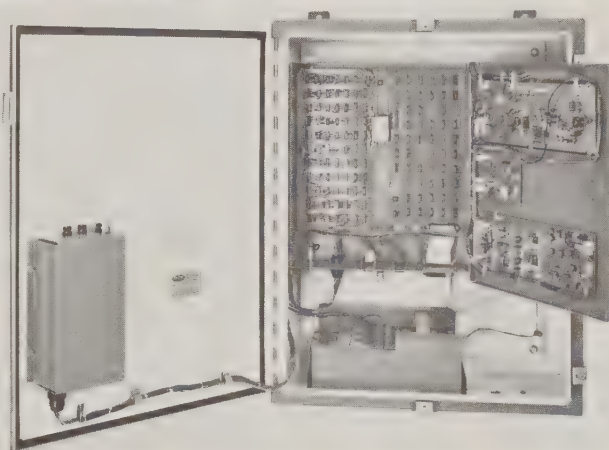
The SNOTEL communication system is the first large-scale application of "meteor burst" technology. It was designed and is being installed by the Western Union Corporation under contract to SCS.

The radio will read data from as many as 16 sensors every 15 minutes and store the information awaiting the signal from a master collection station to transmit.



Microprocessors take the place of more bulky conventional integrated circuits and help radios "remember" their jobs.

An electronic package at each SNOTEL remote site collects and transmits data on command from master collection stations in Idaho and Utah.



The meteor burst phenomenon was discovered accidentally by radio operators who found their signals reaching long distances when inadvertently bounced off meteor trails. The principle gained attention when radio contact with astronauts temporarily was lost during re-entry. The cause of the blackouts: a sheath of ionized gasses surrounding the space capsule repelled radio signals.

Another key to development of SNOTEL is the recent addition of microprocessors to two-way radio systems. The revolutionary component is a tiny piece of silicon—a "computer on a chip"—that gives radio equipment the ability to store, then rapidly process and transmit data.

The SNOTEL system is the latest refinement in a federally coordinated cooperative program of snow surveying and water supply forecasting

undertaken in 1935. Today, there are more than 1,700 SCS snow survey courses throughout the western United States and in Alaska.

Usually, small meadows high in watersheds are selected for snow survey courses. Although automated measuring devices have been installed at many remote sites during the past decade, snow surveyors still visit most locations on set schedules. In a typical snow survey season, surveyors travel more than 50,000 miles by oversnow machines, skis, or snowshoes to bring back snow survey information for computing water supply forecasts.

Snow-gaging equipment and other measuring devices at the SNOTEL remote sites generally will be the same as those used at presently automated snow survey locations. At each site is an inch-thick, stainless

steel "pillow," filled with antifreeze and laid on the bare ground. The pillow serves as a sensor leading to a series of devices that convert the weight of snow resting on the pillow into an electrical reading of snow's water content. Other sensors at the site include rainfall gages, thermometers, and other climatological instruments.

Additional equipment at the sites selected for conversion to the SNOTEL system includes a radio transmitter-receiver, powered by batteries connected to solar panels. The radio will read data from as many as 16 sensors every 15 minutes and store the information awaiting the signal from a master collection station to transmit.

The new communication technique will eliminate the need for building and maintaining the series of relay stations now required to transmit information from presently automated snow survey locations. It also will eliminate hazardous, time-consuming manual surveys on critical measurement sites where surrounding terrain makes relay stations impractical. With SNOTEL,

The SNOTEL system, with its ability to provide new data nearly instantaneously, will help forecasters determine the timing of streamflows as well as the volume.



Snow in the jagged Rockies is the source of much of the western water supply.

The new technique will eliminate hazardous, time-consuming manual surveys on critical measurement sites where surrounding terrain makes relay stations impractical.

distant or hard-to-reach snow courses can be "surveyed" as often as new information is needed.

Automated SNOTEL sites will go into operation on a test basis as they are linked to the new communication system this spring and summer. The first phase of the SNOTEL system, involving 160 sites, will be in full operation by late summer. And within the next 3 years, about 500 remote snow survey sites are scheduled to be automated, providing an improved information system for water users throughout the West.

Mountain snowpack accumulated during winter and spring provides more than 70 percent of the western water supply during the year. The SNOTEL system, with its ability to provide new data nearly instantaneously, will help forecasters determine the timing of streamflows as

well as the volume. In the future, humidity, wind speed and direction, and other environmental data may be added to the information relayed from SNOTEL sites.

The new system will not completely replace the older snow survey techniques, largely because of cost. Manual measurements still will be taken on easily accessible survey courses.

States included in the SNOTEL network are Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. Although a number of remote sites in Alaska are being automated, they will not be tied into the network. In California, SCS is working with the State Department of Water Resources, which has its own survey and forecasting program.

Regardless of the level of

automation in different states, snow surveyors will continue to go through essentially the same historical process—gathering data from January to June, processing the information through special formulas to obtain water forecasts, and issuing frequent outlook reports for every important watershed at key points along rivers and at reservoirs.

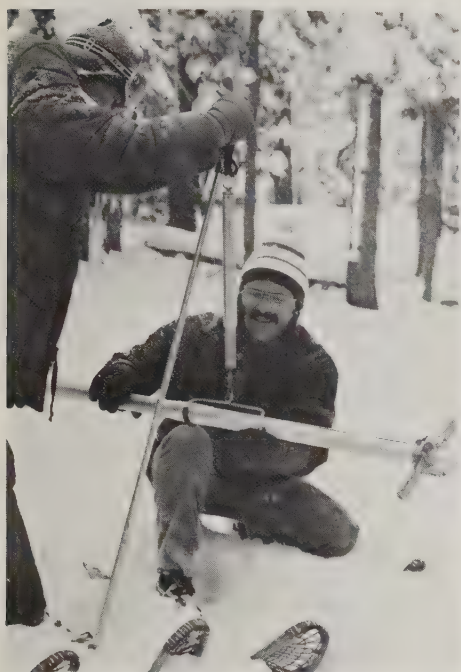
But future forecasts will be more accurate and up-to-date, thanks to quarter-inch silicon chips and to tiny bits of space debris meeting a fiery end.

Mr. Barton is Head, Water Supply Forecasting Unit, SCS, West Technical Service Center, Portland, Oregon.

Photos courtesy Intel Corporation, Western Union Corporation, and USDA.

What's It Worth?

by Shirley J. Elliott



Snow surveyors taking February measurements this year at Mount Hood found levels at one-third the long-term average. Use of water supply forecasts brings more income to irrigated farms.



During present drought conditions in the West, one might suggest water supply forecasts are invaluable to irrigation farmers. But during an average year, the forecasts provide benefits in 11 western states of \$43,436,000, according to a recent Soil Conservation Service study.

The evaluation, conducted last year, noted that the addition of the SNOTEL automated system is expected to increase the program's benefits by \$4 million to \$6 million a year.

The value of water supply forecasts was estimated using crop yields and prices, water supply levels, water prices, farming methods, and other factors. Data gathered at field locations were incorporated into a complex economic model designed to show differences in net income for average size irrigated farms.

Of the 16 million acres of irrigated land in the 11 western states, about 10 million acres are served by water supply forecasts. Farmers who do not use water supply forecast information tend to plant about the same acreage and the same crops each year. Farmers

who use the forecasts to plan farm operations alter the acreage used and the types of crops planted.

The increase in income provided by using water supply forecasts varies from year to year, depending on crop market conditions and the water supply itself. It also varies greatly from place to place, depending on climate.

Some areas, for example, have a desert climate that requires full irrigation for any agricultural enterprise. The water supply is scarce and highly variable, and even in the best years, it is totally allocated. For a 320-acre farm in such an area, careful use of water supply forecasts can increase average annual net income by \$90 per acre.

A less dramatic increase is reflected in areas that have a more gentle climate with a moderate growing season and limited rainfall. In this case, the evaluation showed that using water supply forecasts can increase average annual net income by about \$5 per acre.

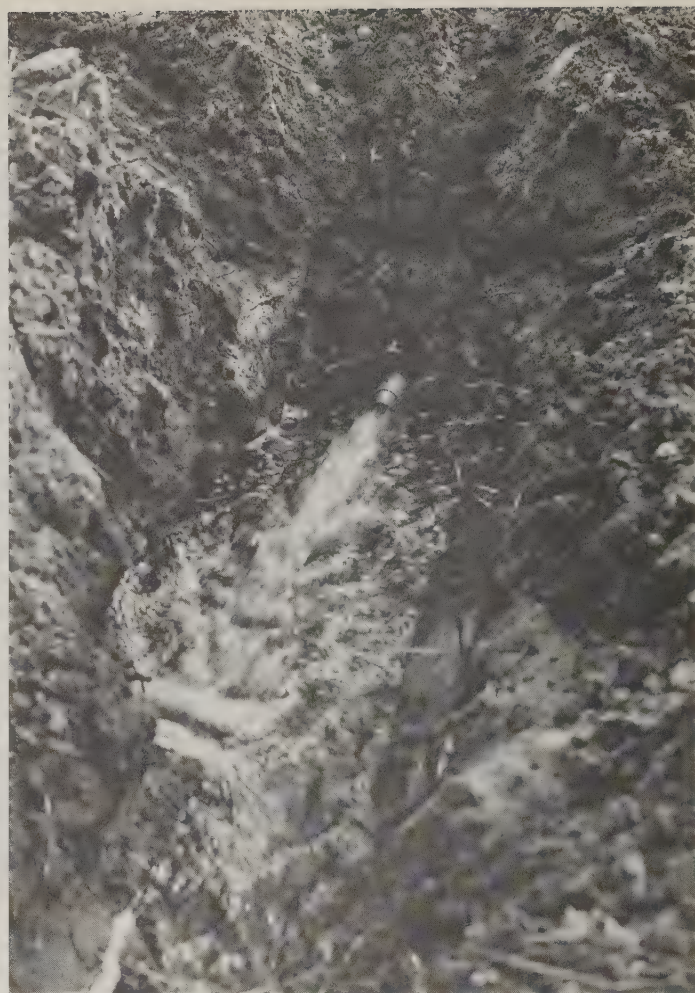
The evaluation of the snow survey and water supply forecast program

also concluded that:

- Irrigated agriculture and agriculture-related businesses constitute more than half of the water supply information users.
- The SCS water supply forecast procedure is the most accurate currently available. The SNOTEL system is expected to increase overall accuracy by 20 to 30 percent.
- With SNOTEL in operation, the program will provide \$20 in benefits for each dollar spent obtaining and issuing water supply forecast data.

The study also found a variety of forecast users in addition to those related to irrigated agriculture. They included individuals and agencies responsible for flood control, municipal water supplies, reservoir management, power generation, recreation, industry, and fish and wildlife management.

Ms. Elliott is a program analyst, Program Evaluation Division, SCS, Washington, D.C.



An irrigation system being adopted by many Florida farmers uses less water and labor to do a better job.

by Martin L. Clark

Plastic Pipe Replaces Ditches

"I'm sold on semiclosed irrigation systems. They save water, electricity, and labor," said John "Buck" Sykes, an Elkton, Florida, vegetable grower.

For 50 years, vegetable farmers in St. Johns County used open irrigation mains, 6 feet and deeper, and shallow laterals to irrigate their crops. This system required large pumps to fill the main ditches before water would spill into the laterals.

By replacing the open main ditches with 2- to 6-inch plastic pipe buried 2 feet deep, a semiclosed system uses almost 40 percent less water. A 40-acre semiclosed system can save 2.5 million gallons of water during a 4-day irrigation period. Because it must transport less water, a semiclosed system requires fewer pumps, less pumping time, and less energy.

Sykes, a cooperator with the St. Johns Soil and Water Conservation District (SWCD), formerly used three pumps to irrigate the same acreage he now irrigates with one.

Filling mains and laterals using old open system (far left) often takes a day or more. Water reaches furrows (at left) as soon as pump is turned on in semiclosed system.

Cabbage and potatoes provide the first test for semiclosed systems in Florida.



Joe Davenport, SCS district conservationist, noted, "Buck's system is designed so that all he has to do to irrigate a 40-acre field is turn on his pump. The same 40 acres used to require one man working a day and a half to irrigate."

In a semiclosed irrigation system, a plastic gate valve installed at each lateral controls the volume of water. By following SCS guidelines, a farmer knows how long he must run his pump to most efficiently irrigate a particular crop.

"The old open system served the purpose for many years, but growers had to keep a close watch to make sure it was working just right," according to Davenport. "Otherwise, too much or too little water could get to the crops. Either situation could mean crop damage."

Davenport has helped cooperators in the St. Johns, Putnam, and Flagler SWCD's plan more than 400 semiclosed systems. More than 300

already are developed, irrigating 14,000 acres in the area.

Semiclosed systems are becoming more popular in other parts of the state as well, especially in the vegetable-growing area of the Hillsborough and Palm Beach-Broward SWCD's.

Semiclosed irrigation systems conserve water in other ways, too. Because the water going to crops is more closely regulated, less water runs off fields and into the St. Johns River. And since the water travels through buried pipe, much less evaporates.

Irrigation water and municipal water for central and south-central Florida is pumped from the Floridan Aquifer. More efficient irrigation results in less water being pumped from the aquifer and slows the rate of saltwater seeping into it.

Mr. Clark is public information officer, SCS, Gainesville, Florida.

Semiclosed systems eliminate the need for repair of clogged, broken pipe (top) and provide control valves in each lateral (bottom) for careful regulation of water reaching crops.

Bumper stickers in Bucks County, Pennsylvania, proudly proclaim membership in the Peace Valley Yacht Club—a distinction that impresses few neighbors.

The World's Least Exclusive Yacht Club

by Frederick E. Bubb

Lake Galena, formed by P. L. 566 dam, offers most popular small-boating site in Bucks County. A 1,500-acre park surrounds the 2-mile-long lake.



A few years ago, Bucks County, Pennsylvania, didn't have a body of water wider than "a couple of bathtubs," according to one resident. Today, it is the site of "the world's least exclusive yacht club."

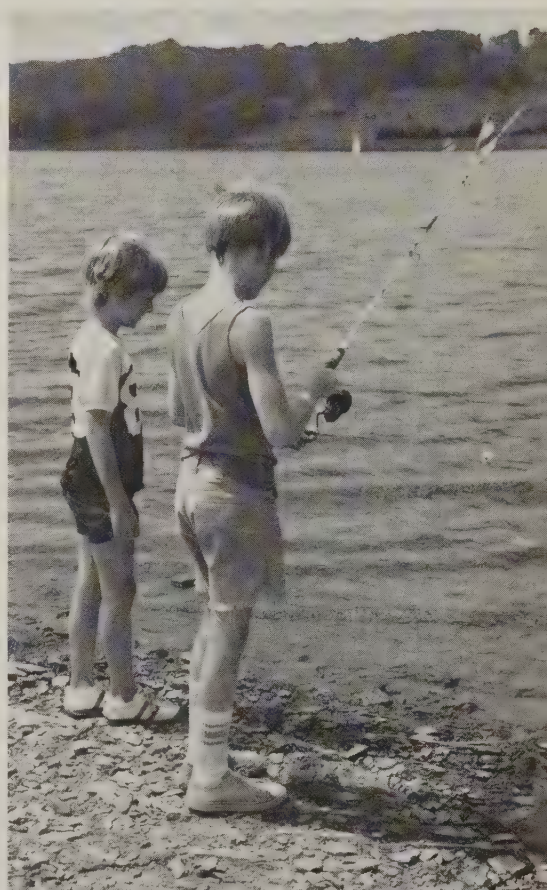
Peace Valley Yacht Club is headquartered on Lake Galena, within 35 miles of Philadelphia. The lake, completed in the fall of 1973, is one of 10 built as part of the Neshaminy Creek Watershed Protection and Flood Prevention Project. The lake provides water for Bucks County as well as flood prevention and recreation.

Sponsors of the Public Law 566 project are the Bucks County and Montgomery County conservation districts and the two counties' boards of commissioners.

Lake regulations ban power boats and limit all other boats, except canoes, to 16 feet or less in length. More than half the watercraft on the lake are sailboats.

Peace Valley Yacht Club was started in 1974 by the Bucks County Department of Parks and Recreation. Its membership has gone from 800 during its first year to more than 1,300 in 1976.

"Very few of our sailboats cost more than \$1,000," reported club spokesman Ronald Ebberts. "Some of



the used craft cost as little as \$100. Our dues are \$10 a year per family, and membership is open to any Bucks County boater. That's why we are the least exclusive yacht club in the world."

The club, a member of the North American Yacht Racing Union, conducts a regular racing schedule on the lake.

Lake Galena is 2 miles long, covers 365 acres, and is surrounded by a 1,500-acre county park.

Peace Valley County Park's temporary facilities for boating, fishing, and picnicking already are overused, according to George Collier, SCS district conservationist, Doylestown. "By the end of last September, we had more than 114,000 visitors, and most of the facilities planned for the park weren't even completed yet," Collier noted.

Construction began early this year on more parking, boat access, and picnic areas—plus facilities for nature study, horseback riding, and golf—using SCS and local funds. When finished, the park will accommodate 180,000 visitors a year.

Mr. Bubbs is public information officer, SCS, Harrisburg, Pennsylvania.



George Collier looks over stone waterway that carries storm runoff water from park without danger of soil erosion.

Young fishermen are among thousands who visit lake—even before recreation facilities have been completed.

Fishing Fingers

by George N. Collier



Pine Run Reservoir's new peninsulas help trap sediment, improve fish habitat, and add shoreline for recreation use by residents of adjacent retirement community and nearby towns.

Less than a mile from Peace Valley's busy yacht club is a small reservoir that has undergone a transformation with fish and fishermen in mind.

Another of the 10 lakes and reservoirs that are part of the Neshaminy Creek Public Law 566 project, Pine Run Reservoir was designed for flood control. With the addition during 1975 of a series of fishing peninsulas, or fingers, at the upper end of the 40-acre reservoir, stocked fish can survive year around.

"The flat valley floor lends itself well to the changes we've made," noted John T. Carson, recently retired executive director of Bucks County's Neshaminy Water Resources Authority. "Deepening the shallow end of the reservoir—where there used to be less than a foot of water—and building peninsulas with the dredged soil has given us pool areas up to 4 feet deep."

The pools provide still-water habitat for largemouthed bass stocked by the Pennsylvania Fish Commission. The \$34,000 effort, financed by Bucks County, is one of the measures outlined in a watershed-wide fisheries plan developed by the fish commission and Public Law 566 project sponsors.

"The fingers also serve as moneysaving sediment traps," according to Carson. "We expect that minor dredging around the peninsulas will eliminate the more expensive maintenance process of lowering the water level to remove sediment that otherwise would spread throughout the upper third of the reservoir."

Plans are underway to add a picnic area, parking lot, and other facilities to further improve the area for recreational use.

Mr. Collier is district conservationist, SCS, Doylestown, Pa.

Patterned Soil Grows Grass in the Desert

At right, imprinter creates patterns in soil with a single moving part—a massive compound roller with central axle which turn together as a rigid assembly.



Tillage roller also crushes brush and other plants to form mulch that increases infiltration rate and reduces soil erosion.

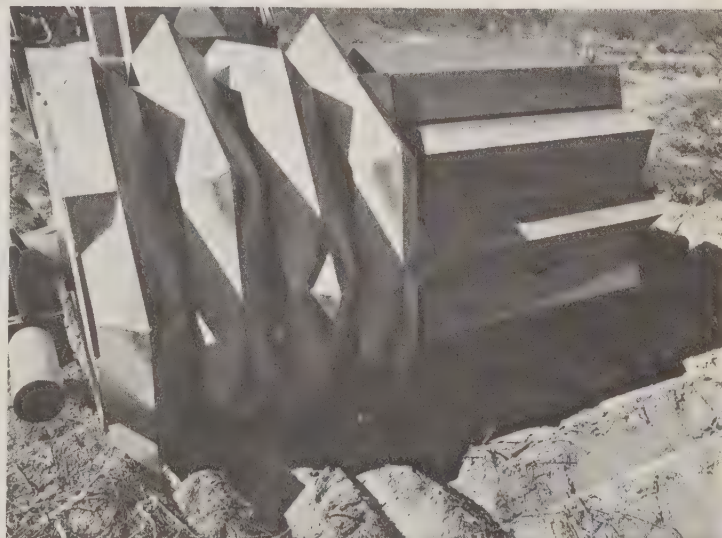


Grass may be grown successfully in many arid and semiarid lands, like these near Tucson, Ariz., with newly invented land imprinter.



After imprinting, grass is planted in vertical furrows. Right-angle furrows supply additional runoff water to germinate seeds during infrequent rains.

So far, 10 imprint cylinders, which can be paired to produce 45 different geometric patterns, have been developed and fabricated. Weight of cylinders can be increased by filling with water.



A newly developed land imprinter shows promise of turning arid wastelands into grasslands by “waffling” and mulching the soil to catch runoff and increase infiltration.

A new tillage implement may help create grassland out of near-barren desert in the Southwest and other dry areas.

The tool, called a land imprinter, is the invention of Dr. Robert M. Dixon, soil scientist with the Agricultural Research Service's Tucson, Ariz., research center. The imprinter presses furrows and seedbeds of varying depths in geometric patterns on depleted rangeland. The patterns direct runoff water and concentrate it where new vegetation is seeded.

Bare soil in the Southwest sheds water because it has well-developed surface drainage patterns and because each raindrop seals the surface more tightly. Water that does soak in penetrates the soil to such shallow depths that it evaporates quickly. Plants die out and leave the surface more barren than before. Overgrazing,

overcultivation, and short-term droughts accelerate surface sealing.

Dixon's land imprinter ends this process by increasing the infiltration rate of water and getting strips of healthy grass started. The implement consists of two hollow steel cylinders, each about 40 inches wide, towed in tandem by a tractor of at least 30 horsepower. Angle irons welded to the cylinders form the geometric patterns.

Typically, one cylinder indents runoff furrows, while the other forms a seedbed for grasses. The runoff strips conduct rainfall into seedbed furrows, where it is held until it soaks in.

In tests conducted last summer, sideoats grama seed germinated quickly in the runoff-irrigated seedbed. Most seedlings grew well.

The imprinter also crushes brush and other plants to form a mulch, which shields the soil from the direct

impact of raindrops and provides food for ants, termites, and small rodents that perforate the soil.

With variations in cylinder combinations, the compound roller also can crush soft rock, embed brush and rock into the soil, and compact or dig the surface.

“Imprinting very effectively controls erosion,” says Dixon. “The compacted, stable surface and the vegetation and rocks embedded in the soil protect against wind erosion. And because imprinting breaks up established surface drainage patterns and controls runoff, it protects against water erosion.”

While the land imprinter costs about the same as existing range tillage implements, it is more versatile and costs less to operate and maintain, according to Dixon.

The scientist presently is modifying his invention to make it useful on cropland.

Modern irrigation and conservation techniques are helping give an age-old crop a new start on the slopes of Mount Haleakala in Hawaii.

Irrigation through the Grapevine

Each week Joanne Tedeschi measures sugar content of ripening wine grapes with a refractometer.



A 200,000-gallon reservoir under construction will assure a stable supply of irrigation water for island vineyard.

Great contoured fields of pineapple and sugarcane represent Hawaiian agriculture to most people. Many would add papaya, banana, and taro to the list. But grapes?

Emil Tedeschi hopes to add to the traditional view of island agriculture with a new venture on the southwestern slopes of Mount Haleakala. He is convinced that table and wine grapes can be produced profitably on the island of Maui, given proper selection, propagation, and processing.

A native of California's Napa Valley, Tedeschi learned vineyard culture and winemaking while working for a winery there. He planted the 7-acre Maui vineyard about 3 years ago as a joint undertaking with the Ulupalakua Ranch.

Tedeschi, a cooperator with the Central Maui Soil and Water Conservation District, turned to SCS for help in laying out his vineyard on the contour and in designing its drip irrigation system.

SCS technicians recommended suspending laterals and emitters on the vine trellises rather than using conventional on-the-ground installation of the drip irrigation lines. The system allows easy maintenance and efficient water application.

A 200,000-gallon reservoir under construction upland from the vineyard

will assure a source of irrigation water during critical stages of grape growth. SCS provided technical help for the project, and financial assistance came from the Agricultural Stabilization and Conservation Service.

Tedeschi used the published co-operative soil survey to help determine his land's characteristics of drainage, waterholding capacity, soil texture, and acidity.

He first made test plantings of 140 varieties of grapes. Included were several from South Africa, Australia, and California. He now has narrowed that number to two varieties.

Determining the best time for harvesting grapes is critical. Tedeschi and his wife, Joanne, use a sugar refractometer to make weekly checks of the ripening grapes. "The proper sugar content depends on the kind of wine you want, but it generally should be between 20 to 24 percent for wine making," according to Tedeschi. "For table grapes, the proper sweetness is determined by taste."

Tedeschi says most of his production will go to making wine, which requires 2 to 5 years of aging. However, Mauians can expect some locally grown table grapes on the market late this summer.

Mr. Hamura is a soil conservationist, SCS, Wailuku, Hawaii.

208 Film In Production

A University of Wisconsin production crew is filming sediment control and stormwater management practices in 11 states for a movie on nonpoint-source pollution.

The film, contracted by the National Association of Conservation Districts, will feature efforts by landowners, government agencies, and conservation districts to prevent sediment and nutrient runoff.

"We want to illustrate the issues and activities that are being generated by Section 208 of the Federal Water Quality Act Amendments of 1972," said Director J. Robert Burull.

Burull's crew is filming pollution problems and control efforts in Arizona, Idaho, Indiana, Kansas, Maryland, New Mexico, North Carolina, North Dakota, South Carolina, Washington, and Wisconsin.

The film, being produced under an Environmental Protection Agency grant, is scheduled for release during fall 1977.



Meetings:

March

- 5-9 Association for Supervision and Curriculum Development, Detroit, Mich.
- 6-8 The Wildlife Society, Atlanta, Ga.
- 6-9 North American Wildlife and Natural Resources Conference, Atlanta, Ga.
- 20-25 American Concrete Pipe Association Annual Convention, Las Vegas, Nev.
- 21-24 Land Use Planning Symposium, sponsored by Soil Conservation Society of America, American Institute of Planners, American Society of Planning Officials, Council of State Governments, National Association of Conservation Districts, and Urban Land Institute, Omaha, Nebr.
- 21-25 Hardwood Plywood Manufacturers Association Annual Spring Meeting, Cancun, Mexico
- 25-27 National Wildlife Federation, Washington, D.C.
- 30-31 Air Pollution Control Association, Washington, D.C.

April

- 3-5 American Pulpwood Association, Atlanta, Ga.
- 3-6 National Water Safety Congress, Memphis, Tenn.
- 6-8 Engineering Geology and Soils Engineering Symposium, Pocatello, Idaho
- 11-16 International Agricultural Plastics Congress, San Diego, Calif.
- 23-28 American Society of Planning Officials, San Diego, Calif.
- 24-27 Association of American Geographers, Salt Lake City, Utah

May

- 8-11 National Forest Products Association, Washington, D.C.
- 8-13 National Council of State Garden Clubs, Inc., Convention, Kansas City, Mo.
- 8-13 The American Water Works Association Conference, Anaheim, Calif.
- 10-12 Conference on Great Lakes Research, Ann Arbor, Mich.
- 23-25 1977 National Conference on Water, St. Louis, Mo.
- 30-June 3 American Geophysical Union, Washington, D.C.

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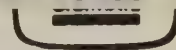
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April 1977

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Our Final Product

From the Administrator

In a recent letter to SCS employees, I asked: "Are we keeping sight of the final product?"

For SCS, and for conservation districts and their cooperators, that final product always has been conservation applied to the land.

One useful tool for accomplishing this goal has been a conservation plan built around potentials of the soils on each tract of land and responsive to the needs and wishes of the land operator. There is no question that a sound conservation plan is a good beginning for a soil and water management program.

We all must remember, however, that it is only a beginning. We must avoid putting so much emphasis on planning that it becomes an end in itself. Adequate followthrough is necessary—to get the measures completed that are called for in the plan, and to find out periodically if the planned conservation actions still fit the landowner, the uses of his property, the trends in technology, and the climate.

Particularly on land where soil erosion problems are most critical, we cannot afford to wait until a cooperator knocks on our door and requests that we help him design a conservation system. A passive approach may result in steady planning, but it will not bring rapid enough achievement of water quality goals or protection of the land.

In a voluntary program like ours, it is crucial to seek out the acres and the people who need our assistance the most and help make meaningful improvements. The results will help prove the value of the voluntary approach and of fuller conservation systems.

Landowners, land uses, and the needs of American people do change—and our conservation program must remain quickly adaptable . . . open . . . responsive . . . and aimed at positive results on the ground.

Now, more than ever, conservation districts and SCS need to work closely together in finding ways to achieve a renewal of our basic mission: to get more soil and water conservation on the land.

A handwritten signature in black ink that reads "Mel Davis". The script is fluid and cursive, with a large, stylized "M" and a long, sweeping tail on the "s".

Soil Conservation is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil Conservation* has been approved by the Director of the Office of Management and Budget through July 31, 1978.

Bob Bergland
Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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Cover:

People, livestock, and wildlife depend on good quality water in rivers and lakes. According to an EPA official, managing the quality of water is one of the biggest challenges in protecting the environment. (See page 8.)

Soil Conservation

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Minimum tillage protects the soil from erosion and may increase production while reducing production costs.

by Marjorie Johnson

Minimum Tillage: Saving Soil in Texas and Oklahoma

New farming techniques, such as minimum tillage, sometimes take a while to catch on; but more and more row crop farmers are trying it and saving soil and money.

"In Texas, a switch from conventional tillage to minimum tillage saves an average of about 5 gallons of tractor fuel per acre per year," said T. V. Jamieson, regional agronomist for the Soil Conservation Service in Fort Worth. "Since some 1.5 million acres were farmed with minimum tillage last year, this amounted to a saving of some 7.5 million gallons of tractor fuel."

Oklahoma has almost 2 million acres of minimum tillage according to Ted Lehman, SCS state agronomist in Stillwater. "Most of this is on wheatland," Lehman said. "Winter wheat seeded without tillage in standing sorghum stubble produces grain yields equivalent to those produced where the sorghum stubble was plowed and disked.

"Standing sorghum, corn, or small grain stubble afford protection from the strong winds in western Oklahoma," Lehman said.

Farmers are using several methods of minimum tillage but none involves traditional plowing and cultivating. Some minimum tillage farmers plant a winter cover crop, such as rye, after the fall harvest. In the spring, they kill the rye with chemicals, then seed the



main crop into the stubble or mulch with a special planter.

Some minimum tillage systems require only one or two trips across a field from harvest to harvest. Conventional methods require 6 to 20 trips.

"Since this farming system leaves the surface largely undisturbed," Jamieson said, "residues from the previous crop protect the soil. Rain falling on bare land dislodges the soil particles and they are carried away by runoff water. Crop residues left on the surface catch the raindrops and let them trickle gently onto the soil surface."

Labor shortages in World War II were responsible for the initial push in minimum tillage techniques. Industrious farmers, anxious to finish planting on time, learned they could save time and labor by planting row crops in narrow strips of soil cut open by a coulter blade or chisel. The tractor wheels finished the job by compacting the seedbed.

Minimum tillage methods have some disadvantages. Insects tend to thrive in undisturbed soil and mulch. They can be held in check, however, if the farmer anticipates the problem and selects the proper insecticides.

In some minimum tillage systems, herbicides take the place of cultivations in controlling weeds. Herbicide application must be timed

precisely. Enough mulch is needed to check erosion, but not enough to smother the small plants. Minimum tillage methods also tend to lower soil temperatures, thus affecting germination. Some soils are unsuitable for minimum tillage; but where it does work, it may reduce production costs.

"Most of these problems will be solved in time by science," said Jamieson. "Long-term benefits, though, may very well lie not in farm economics but in conservation."

Minimum tillage farming makes soil erosion a much less limiting factor. When soil is left unturned and protected by a layer of mulch, it can retain more moisture than a plowed field. Minimum tillage farming can reduce soil losses on sloping land subject to severe erosion from 75 to 95 percent.

Jamieson told of a farmer whose 1,200-acre farm was producing about 300 acres of corn, 300 acres of small grains, 300 acres of hay and pasture, and 300 acres of permanent pasture. Now, with a minimum tillage system, the farmer produces about 550 acres of corn and 550 acres of small grains. He later doublecrops the 550 acres of small grains in soybeans, planting directly into the stubble. The remaining 100 acres of cropland is in permanent pasture.

Minimum tillage has significantly increased the farmer's acreage and

production volume without soil erosion hazards.

"For minimum or no-till double cropping to be a success, several practices are helpful," Jamieson said. "An excellent stand of well-fertilized small grain is an asset in weed control. The small grain needs to be harvested as soon as possible. This increases the chances for maturity of the second crop. A proper combination of herbicides, correct cultural techniques, and proper maturing varieties must be used. There must be sufficient moisture and adequate fertility."

Jamieson listed some of the advantages of a minimum or no-tillage system:

- Wind erosion is a big problem in the Southwest. Stubble left on the field is especially effective in preventing wind erosion, thereby contributing to a better environment. Minimum tillage also cuts the amount of polluting sediment entering water supplies, streams, lakes, bays, harbors, and estuaries.
- An unfurrowed field with a protective mulch cover keeps the soil cooler in the summer and warmer in the winter. Soil moisture evaporates more slowly and soil near the surface maintains extra moisture which often extends the planting season.
- Bare soil offers nothing for wildlife. Stalks, leaves, and scattered seed from a previous crop offer food and cover for game birds, deer, and other wildlife.
- Fewer tillage operations mean less soil compaction with heavy farm equipment. In a carefully managed minimum tillage system, row crops can be grown in narrow strips that are never touched by tractor wheels.

Special equipment that prepares a seedbed, plants, and applies insecticides, herbicides, and fertilizers is available but not always necessary.

Ms. Johnson is editorial assistant, SCS, Fort Worth, Tex.

Reprinted with permission from "Southwest Farm Press," Nov. 11, 1976.



Above, drilling wheat directly into sorghum stubble.
At left, harvest of a trial no-till crop on a southeast Texas farm.

Soil Science for Four-Year-Olds

Preschoolers are not too young to learn about soil and SCS is teaching them, using a method they enjoy.

by Katharine Mergen

Camera crew at station WMAR-TV focuses on a Romper Room class during a live broadcast which featured conservation and the work of a soil scientist.





Romper Room teacher, "Miss Sally" Rogers, SCS soil scientist Horace Smith from the Maryland State Office, and the Romper Room class discuss the soil scientist's work. On the same day, SCS conservationists were featured in similar live broadcasts from 17 stations in 15 states.

How can the Soil Conservation Service broadcast a live TV conservation message to nearly a quarter-million viewers in one day?

Try "Romper Room."

Three years ago the program coordinator of the national children's show, headquartered in Baltimore, Md., invited SCS to participate in a conservation series broadcast live on 22 TV stations in 19 states.

Besides the original live shows, station WMAR-TV in Baltimore videotapes Romper Room programs for distribution to about 35 other markets for later scheduling. According to Peggy Powell, national program coordinator, Romper Room reaches a home audience of more than a million preschoolers every week.

The SCS segments titled "Rocks and Soil" have been part of the Romper Room program for 3 years. Early this year, a fourth segment describing the work of soil scientists was prepared for a series on "What Scientists Do."

For each program a lesson plan outline was provided through SCS public information officers to SCS conservationists assigned to do the live broadcasts. Objectives of the program were defined, materials

listed, and procedures suggested for each show. No two broadcasts were identical, but the outline gave direction and cohesion to the program content.

The basic message to be absorbed by young minds in each instance was: Soil is not "dirt," soil comes from rocks, there are different kinds of soil, and plants must have good soil in order to grow and furnish food, flowers, grass, and other things that people need.

Essential to the live broadcasts were numerous "hands-on" activities. By following the example of the conservationist, youngsters rubbed together two pieces of soft rock to make "soil particles" that they then compared with samples of sand, loam, and clay for differences in texture.

Each child mixed his or her own soil by combining sand, loam, and clay in a plastic pot; stirred the mixture well; and buried a bean in it to grow his or her own plant. Throughout the show, the SCS conservationist called attention to several plants in pots to show that they were growing in soil.

Romper Room teachers have been known to extend the scheduled 5-minute segment, but Kent Hortin, district conservationist (DC) from Midvale, Utah, may be the only one to

have his 5 minutes extended to two programs. For the first segment when the teacher added some slides of Bryce Canyon and Zion Canyon National Parks to the program, Hortin used them to discuss the weathering of rocks in relation to soils.

For his second segment, which was shown a few days later, Hortin showed water movement in the soil as the children planted beans. At the end of the segment the teacher invited everyone with soil problems to call SCS.

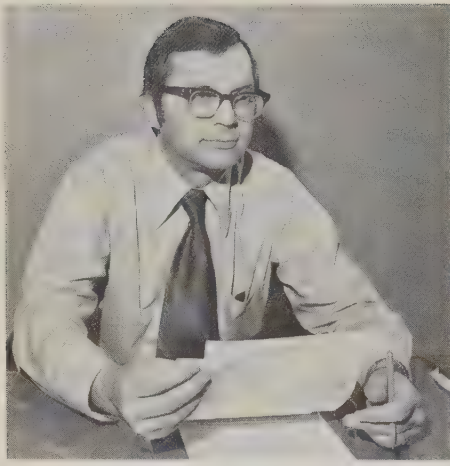
SCS people have been creative when conditions precluded following the script. Ronald Smola, DC in Tampa, Fla., faced with a 15-minute segment to fill and no soft rocks available, substituted soils of different colors that could be picked up by the camera. He reported that this intrigued the children just as much as feeling soil textures.

The Romper Room programs have allowed SCS employees to reach the public in other ways. When Shirley Kerr, an SCS staff member from Redlands, Calif., was scheduled for her second Romper Room appearance, she rated a feature story in a local newspaper, including a paragraph summarizing SCS services to land users.

After Bob Jonas, DC in New City, N.Y., completed a recent broadcast on station WOR-TV, he received a call from an architect who wanted the program repeated for his Lions Club.

Not all 4-year-olds will be ready to deliver a lecture on soil characteristics following a broadcast, but educators emphasize that early childhood impressions are important. One little boy scooped up a fistful of moist, loamy soil during a show, buried his nose in it, and then smiled up at the SCS conservationist. "It smells good," he said.

Ms. Mergen is head of educational relations, Information Division, SCS, Washington, D.C.



Remarks made by Mr. Krivak, Chief, Nonpoint Sources Branch, U.S. Environmental Protection Agency, at the annual convention of the National Association of Conservation Districts, Atlanta, Ga., in February 1977.

by Joseph A. Krivak

Meeting Our Nation's Water Quality Goals

At right, sediment deposited in a concrete flume from road construction site upstream.



Below, effluent from sewage system coming to surface in backyard.



"For the first time Congress said EPA, states, and local governments should start looking at the other causes of pollution, such as agriculture, forestry, mining, construction activities, urban runoff, residual waste, and septic tank problems."

Road ditch and culvert completely filled with silt from farm runoff.



I'm happy to report that the Environmental Protection Agency (EPA) at the highest policy level in Washington and at the program level in the field fully recognizes and is totally committed to the conservation district movement. Much of the credit for that understanding goes not to EPA, but to the foresight and aggressiveness of our national and state leaders.

As most of you are aware, EPA is a newcomer to the nonpoint source control program. Most of our interest resulted from passage of the Federal Water Pollution Control Act Amendments (FWPCA) of 1972, and specifically from Section 208 of that Act.

When Congress passed that section, it made it clear that while planning was important, the main reason for providing funds to areawide and state agencies was for development of a management program. First, decisions had to be made on how to meet water quality goals. Second, management agencies had to be established, if they did not exist already. Finally, these agencies had to be provided with the tools needed to get the job done.

Another important part of the section concerned nonpoint source pollution. Previous legislation had focused entirely on the point sources of pollution. For the first time Congress said EPA, states, and local governments should start looking at the other causes of pollution, such as agriculture, forestry, mining, construction activities, urban runoff, residual waste, and septic tank problems.

For the first few years after the passage of the 1972 FWPCA amendments, EPA concentrated on municipal

and industrial pollution. And that may have been a good idea because in the last 4 years a lot of progress has been made.

But while many rivers and lakes are in better shape today, we also know that in quite a few rural and urban areas the job of reducing nonpoint pollution remains.

Fortunately, the technology of sediment control is no secret. We know how to do the job and, thanks to the districts, we have been using the knowledge for 40 years. While a lot of the technical knowledge has been and is being supplied by the 13,000 Soil Conservation Service people and the 17,000 Extension Service people across the country, the biggest job of educating the nation and maintaining political and public support has been done day in and day out, year after year, by the 17,000 district supervisors who form the base of the conservation movement.

The keystone of our nonpoint source strategy is the concept of best management practices (BMP's). Stated very simply, it is the most practical and effective measure or combination of measures which will prevent pollution or reduce it to a level compatible with water quality goals. Sounds familiar, doesn't it? It's what districts have been doing for the past 40 years. But if it's a

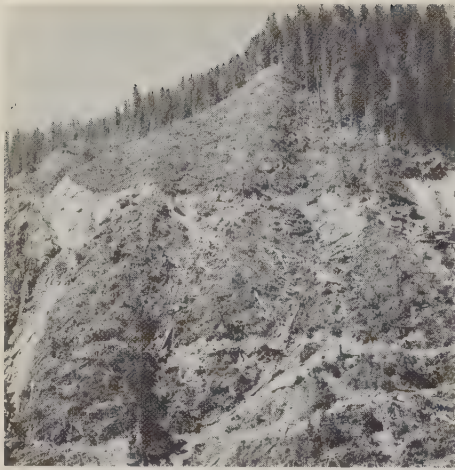
good idea, and it is, why not spread the concept to more nonpoint source problems than just agriculture and forestry?

Develop New Techniques

You and EPA know that because of differences in cropping patterns, such as soils, topography, and climate, what works in Georgia may not work in Ohio. Therefore, EPA decided that there would be no national performance standards in the nonpoint source guidelines. It would be left up to the individual states, with the full participation of districts, to develop the kinds of BMP's which will do the job at the local level. On the surface that sounds easy and, again, it's something districts have been doing for years. But remember, in most cases the proven erosion control practices will do the job; in some cases, they will not. So you, and the agencies which assist you, may have to develop some new techniques to get the water quality management job done in a different way than the way in which you deal with sediment and erosion problems.

While the district movement has come a long way in 40 years, we still have a long road to cover. Meeting our nation's water quality goals is yet to be done. Achieving leadership in this

"The keystone of our nonpoint source strategy is the concept of best management practices. Stated very simply, it is the most practical and effective measure or combination of measures which will prevent pollution or reduce it to a level compatible with water quality goals."



Most erosion in woodland areas occurs along roads and highly disturbed areas. This steep slope and a soil subject to slipping are endangered by the trails made by tractors.

“EPA is convinced that state and local governments should turn to districts for assistance in nonpoint planning and implementation. We have done everything that we can to make known our positive feelings about districts.”

field, as you have in the conservation movement, will not come automatically nor will it come easily. EPA is convinced that state and local governments should turn to districts for assistance in nonpoint planning and implementation. We have done everything that we can to make known our positive feelings about districts. And generally local and state governments feel the same way. Many districts are deeply involved in planning at both the regional and state levels. But the biggest challenge lies ahead.

Your movement would not have been successful if planning was the only thing that districts did. Your strength has been in your success in putting conservation on the land. You have gained credibility because you have carried out meaningful programs; you have produced results.

Many districts have experienced and evaluated the limitations of the voluntary approach. When something more than the voluntary approach was needed, they acted to provide leadership in the development of mandatory sediment control programs. Today 16 states have adopted sediment control programs largely, if not entirely, because districts have recognized that in some cases a good neighbor policy won't work. If some form of regulatory program is needed, farmers should decide what that program should be and how it will be managed.

What You Can Do

What can you do better than anyone else? Let me name a few aspects of the Section 208 program that you can

do better than anyone else at the state and local level. You can identify and assess the pollution problem and identify and implement appropriate BMP's. You also can identify institutional and regulatory means now available to implement the agricultural

program, as well as other institutional and management arrangements that may be needed.

With the kind of challenge that faces districts, what should you be doing? More of the same in many cases, but a lot of new things, also.

- Get involved in the 208 water quality program if you're not. Educate and inform your public about the job districts can do. Long before environment became popular, your districts were making the major contribution to this cause.
- Actively participate in the development of the 208 water quality program and don't limit yourself to the technical part of the process. Help set the goals and objectives. Help to determine what institutions will manage the program. Help make the decisions.
- Look closely at your district program. Are the technical resources being used wisely? All of us get used to doing things in a certain way and it is often hard to change. Doing a good job of water quality management is different in many ways than carrying out an erosion control program.
- Above all, maintain your position as leaders of the conservation movement. If you have lost it, fight hard to get it back.

I believe the 208 program was timely from the district standpoint. It can and has revitalized the district movement. It is an opportunity giving you a significant new agricultural and urban mission, a means of forging new alliances, and a tool for getting more political clout. How effectively you use this opportunity is up to the 17,000 district directors and supervisors across the country. It won't be an easy job, but it is an important one. I happen to believe only districts can get it done.

EPA is on your side on this issue. We must strengthen our alliance, joining together the newer often urban, environmental concerns with the historic district conservation movement that has accomplished so much in the past. I'm looking forward to a long and healthy partnership between the EPA and the soil and water conservation districts across the country.



Dunes: Land's Defense Against the Sea

Sand dunes have been called the shore's first line of defense against the often terrifying power of the ocean. And it is plants, usually fragile species, that hold the dunes in place. Along the Atlantic coast, homeowners have had to learn and relearn these elementary lessons at considerable cost. Now the Soil Conservation Service and other agencies are showing shore dwellers how to rebuild and maintain dunes.



Above, building beach homes too close to the water's edge is an old but dubious American custom. In doing so, builders frequently breach the dunes—or even remove them—exposing property to the full fury of hurricanes and nor'easters.

At right, northeast storm in 1962 wrecked many homes and hotels along the eastern seaboard, including these expensive shore residences in Virginia Beach, Va. It makes more sense to build homes at least behind the first line of dunes, and to leave the shoreline to the bathers. If dunes have been removed, they should be rebuilt and stabilized.



Below, eroded dunes can be rebuilt, most successfully with snow fences erected at intervals along the shore. Sand accumulates first on the land side of the fence, but within a year, a 4-foot fence may be covered.

At right, buried fence is left in place and new fences put up. The process continues until the dune reaches a desired height—usually 14 to 18 feet.



At left, it doesn't take a bulldozer to tear down a dune. Hundreds of bare feet, day after day, are enough to destroy the vegetation that ties down a dune. Wind, rain, and sea complete the destruction.

At right, during the 1960's, the SCS Cape May Plant Materials Center in New Jersey began a search for a superior strain of beachgrass to vegetate sand dunes along a mid-Atlantic coast. By 1970, an excellent new variety, 'Cape' American beachgrass (*Ammophila breviligulata*), was released to commercial growers.



At right, by the end of 1976, more than 3 million 'Cape' plants had been sold and planted on Atlantic dunes. The variety was selected for its vigor and fast reproductive rate. One stem on a dune quickly multiplies 20 or 30 times.



Today 'Cape' is available from many nurseries along the mid-Atlantic coast. Instructions for planting and maintenance are free from local conservation district and SCS offices.

A pamphlet entitled " 'Cape' American Beachgrass: Conservation Plant for Mid-Atlantic Sand Dunes" is being prepared by SCS and will also be available from SCS offices.

No more hauling water for these Montana farmers and ranchers. They've joined forces to construct a water pipeline to bring the water to them.

Pipe Dream Becomes Reality

by Gordon Watson



"I just couldn't put a high enough dollar value on piped-in water after having to haul it to the farm for the last 58 years and three generations," said Bob Hellinger. Hellinger is a farmer near the north-central Montana community of Galata and secretary of the Galata County Water District, which opened its new water pipeline last October.

Some 72 farmers, ranchers, and townspeople organized the water district 5 years ago. Each contributed \$200 to study the feasibility of constructing a water pipeline to serve the area north of Galata on Montana's highline, paralleling the Canadian border.

Almost immediately, they ran into a problem: A good water source is difficult to find in this area.

The district first drilled a well south of Galata near the Tiber Reservoir, a Bureau of Reclamation project. This water, however, was so highly mineralized that it was unfit for public use.

"The subsurface material in the area is deep shales," explained Eddie Juvan, Soil Conservation Service geologist for Montana. "The shales usually don't transmit water, and any water they do transmit is usually highly mineralized."

The district contacted Juvan and Gordon Watson, SCS district

conservationist at Shelby, for help in finding alternative water sources.

Juvan and Watson investigated a number of sites and suggested that the district drill a test well in the Sweet Grass Hills, north of Galata.

The first hole was a success. According to Juvan, the volume of water was greater than the well near the reservoir, and the quality was excellent. And because the well was at a higher elevation than most of the water users, pumping costs would be lower.

By the time all 133 miles of 6- to 1-inch pipe were laid, 10 more water users had joined the district and 10 more had formed a waiting list.

Miles Burd, president of the Galata County Water District, didn't hesitate in explaining the project's benefits.

"There's a snowstorm coming out of British Columbia this evening," he said. "When that's happened in the past, we'd spend the afternoon hauling water to fill the cistern and hope that the supply would last until the roads were passable again.

"I don't know how much water we hauled on the average in summer, but the water truck was going all the time. We never did have enough water."

"Hauling water required an extra truck and extra time," Hellinger agreed.

"During the last three generations, my family has had to go out of the

livestock business several times due to a lack of water," he continued.

"This won't happen any more, and therefore, I feel that our land is worth quite a bit more."

"There are farmers in the area that were underemployed in the winter and had to go to town for a job," Burd added. "As a result, they usually lived in town and drove out in the summer to farm. They couldn't do the best job of farming because they were in town most of the time.

"This is going to change," he predicted. "The waterline will allow them to keep stock. Then they can live on the farm and make it a full-time occupation."

According to Louann Burd, Miles' wife, the water pipeline will benefit other aspects of farm life as well.

"The farms will have much better yards, gardens, and trees now that we don't have to skimp on water," she said. "These are things that add to the quality of our life."

Mr. Watson is district conservationist, SCS, Shelby, Mont.



Above, crew installing pipeline after connections have been made.

At left, wheel-type trencher excavating ditch for pipeline.



Seven generations of Waybrights have operated their family farm since colonial times. Modern conservation techniques will make this a productive farm for many future generations.

Sitting astride the Mason-Dixon Line in Pennsylvania and Maryland is a 230-year-old farm with a 1977 conservation outlook.

The Waybright farm was created in 1746, when the sons of William Penn deeded a tract of land in Adams County, Pa., and Frederick County, Md., to Michael Waybright. Since then, seven generations of Waybrights have maintained it as a family farm. Today, it forms the nucleus of Mason-Dixon Farms, a corporate Waybright family enterprise.

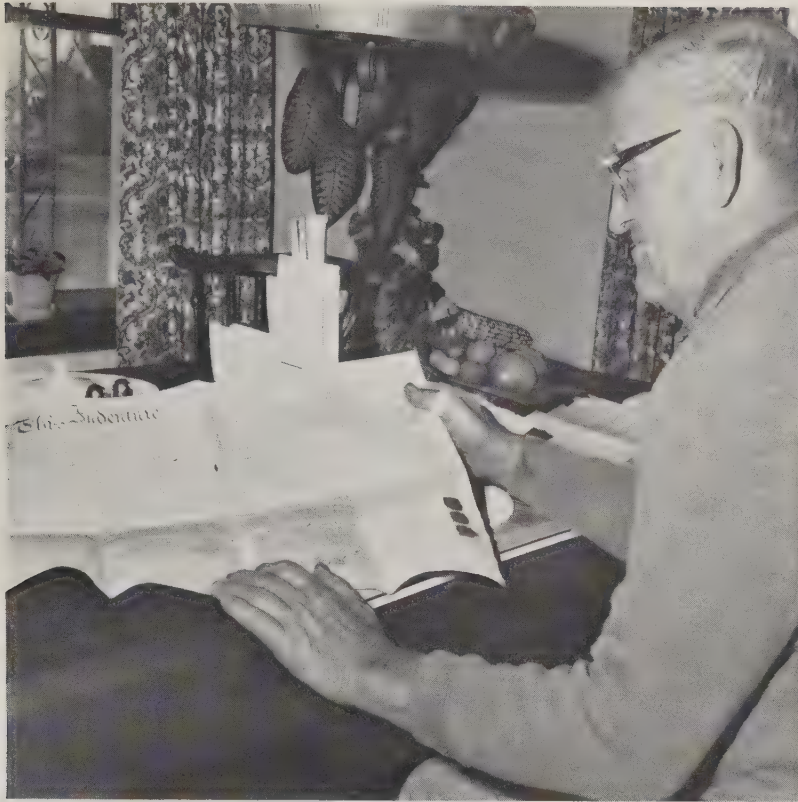
There are three generations of Waybrights currently involved in the farm's operation. Clarence Waybright, the eldest, is a great-great-grandson of the original owner. Clarence's sons, Horace and Richard, manage the field work, while carrying out a growth and expansion program for the farm. A son-in-law, Luther Smith, directs milk processing and sales. Richard's son, Doyle, a recent graduate of the University of Wisconsin, manages the dairy herd.

Through the Waybright family's efforts, Mason-Dixon Farms has grown from a historical curiosity to an

by Thomas A. Balthaser

Conservation on the Mason-Dixon Line

Clarence Waybright looks at the original deed from the Penns in England, granting the Waybrights the land in 1746.



Loading silage on Mason-Dixon Farms from a trench silo about the size of a football field.

agricultural leader in its area and a pacesetter in conservation.

Before 1951, the home farm was a general operation, with only 15 head of dairy cows. "At that time," says Clarence, "I was considering selling out." Their association with the Future Farmers of America, however, convinced both Horace and Richard that the farm could be more productive and more profitable. So they formed a family partnership and launched Mason-Dixon Farms.

Their enterprise is still growing. One of two new dairy barns, each 88 by 566 feet, has been built, and construction of the other will be started this summer. The dairy operation includes a new milking parlor, consisting of two, six-stall, side-opening automated parlors. When completed, the expansion will permit an increase in the milking herd from the present 420 head to 1,000 head.

Animal waste handling facilities are an important feature of the dairy operation. Animal waste, wash water, and runoff from the loafing lots and barns go into a holding pond. Liquids

and solids are separated. The liquids are recycled and used to wash down the loafing areas. The solids are spread periodically on the fields. The new system minimizes pollution of streams from the runoff.

Conservation of soil and water resources was a way of life for the Waybrights long before they founded Mason-Dixon Farms. Stripcropping was laid out on the Waybright acreage more than three decades ago.

In 1947, Clarence helped organize countywide meetings that resulted in formation of the Adams County Soil Conservation District (SCD). Clarence served as vice chairman of the first board of directors. Today, Richard is a director in the Adams County SCD.

Conservation continues to support the growth of the Mason-Dixon operation. Through the Adams County SCD, the Soil Conservation Service provided technical assistance in planning and applying conservation practices on the more than 2,000 acres that the Waybrights now farm. Among the practices installed are minimum tillage, cropland terraces, and diversions.

The Waybrights have not used a moldboard plow in tillage operations for the past 12 years. Instead, notes Richard, they use chisel plows. This keeps more residue on the surface and reduces runoff and erosion. Because of drainage problems on much of the soil, the Waybrights also have installed more than 400,000 feet of tile drainage. To protect the land during the winter months, they plant a cover of barley, wheat, or rye.

They install conservation measures on both the home farm and the farms which have leases of 6 or more years—generating, they say, benefits that more than offset the costs.

The Waybrights intend to continue to apply and maintain conservation practices for many years to come. "We've got an interesting past," observes Richard, "but we are really looking to the future."

Mr. Balthaser is district conservationist, SCS, Gettysburg, Pa.

Gullystopping, Texas Style



SCS District Conservationist Emmitt Yoder (right) and rancher Lynwood Lasiker survey work in progress from a gully yet to be shaped.

Texas farmers are solving an old problem, thanks to a new use of flood prevention project funds for land treatment.

by Anne Zack

For years, mammoth gullies have crisscrossed the land in the Upper Trinity, Middle Colorado, and Upper Washita Flood Prevention Projects. The projects, authorized by Congress in 1944, were forerunners of the Small Watershed Program established in 1954 by Public Law 566.

"Back in the 1920's and 30's and even into World War II, this land was cottoned, peanutted, and peach-orcharded to death with no erosion controls," explained Emmitt Yoder, Soil Conservation Service (SCS) district conservationist at Weatherford, west of Fort Worth in the Upper Trinity watershed.

Gullies grew to depths of 10 and 20 feet and more, eating up cropland and pasture. Sediment began choking downstream flood control structures and municipal water supplies.

"One flood control reservoir built in 1955 has lost 75 percent of its capacity to sedimentation," Yoder said.

Techniques for stopping gully erosion have been available for years from SCS through soil and water conservation districts (SWCD's). But many gullies are so deep and the land around them so marginal that landowners have considered shaping and seeding uneconomical.

"Soil and water conservation are two things I've always been concerned about," said Scott Woody, a dairy farmer near Weatherford. "But \$7,500 or \$8,000 is a lot of money to spend on just 10 acres of my farm. It would take an awful long time to get that money back out of the land."

The SCS state office at Temple, Tex., now is using cost sharing to assist local landowners to carry out critical area treatment that will keep sediment from wiping out flood control benefits in the three Texas watershed projects.

Under the program, SCS will pay 80 percent of the construction cost for critical area treatment in the Upper Trinity and Middle Colorado water-

sheds and 90 percent of the cost in the Upper Washita. The cost-share limit is \$40,000 per farm.

To qualify for the cost-sharing rate, a landowner must have the necessary measures incorporated in his current conservation plan and approved by his local SWCD. The measures may include shaping, seeding, grade stabilization structures, diversion terraces, or waterways.

The cooperator installs all the conservation measures, and he is responsible for inspecting and maintaining them.

SCS currently is planning technical and financial assistance for nearly 18,000 acres of critically gullied land in 12 subwatersheds. The work will cost more than \$7 million. At least 10 more subwatersheds will be included in the program, probably doubling the cost.

Because of the high cost and the time required for each conservation plan, it may take up to 12 years to complete the job, according to George Marks, SCS state conservationist for Texas.

Landowners are enthusiastic about the new cost-sharing opportunity. One of the first to sign up was dairy farmer Woody, a cooperator with the Clear Fork SWCD since 1951. He shaped and seeded the 10-acre gully on his farm and installed a drop structure last spring.

"We need all the help we can get," Woody said. "Last year there were only two places my cattle could cross the gully. We couldn't cross it with equipment at all. And water would run down the gully and flood my neighbor's pasture."

"Now this is productive pasture. Shaping and seeding the gully helped me, it helped the man on the next farm, and it's helping to keep sediment out of Weatherford's drinking water."

Ms. Zack is staff writer, Information Division, SCS, Washington, D.C.

Top photo, raw gully covering 10 acres in the Upper Trinity Project.
Bottom photo, Emmitt Yoder (left) and farmer Scott Woody examine the
shaped and seeded gully.



Marines Win Conservation Battle

by Nancy J. LaLuntas

Preservation of wildlife habitat and conservation education are two aspects of the conservation plan developed by Marines at Camp Lejeune.

Marines at Camp Lejeune, N.C., have an award-winning conservation program for wildlife and forestry management, maintenance of recreation areas, and improved grounds maintenance.

For the third time in recent years, the Marine Corps Base—in competition with military installations throughout the United States—has won the Secretary of Defense Natural Resources Conservation Award. The award is presented annually to the U.S. military installation which has demonstrated, over a 3-year period, the greatest progress in applying resource conservation measures to the land.

Camp Lejeune covers 170 square miles in Onslow County on the southeast coast of North Carolina. Conservation of natural resources there has been a continuing concern for more than 20 years.

In 1956, a cooperative agreement was signed with the Lower Neuse Soil and Water Conservation District (SWCD) asking for assistance in developing a long-term conservation plan for erosion control and grounds maintenance. The Soil Conservation Service, working through the local SWCD, completed the plan in June of that year. It included soils inventory

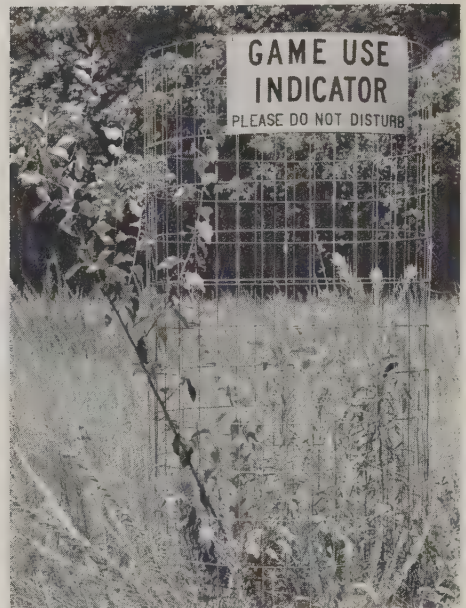
data, soil interpretations, and maintenance requirements for the base grounds.

More than two-thirds of the marine base is in forest, and in 1964, a 10-year forest management plan was developed by the base with assistance from SCS and the USDA's Forest Service. A complete forest inventory and soil survey were made, and the plan—which provides for scheduled timber harvest, prescribed burning and reforestation, erosion control, and wildlife management—is still in effect.

The 1975 Natural Resources Management Plan was prepared by the Marine Corps Base and the Onslow Soil and Water Conservation District (formerly part of the Lower Neuse SWCD) with technical assistance from SCS. The plan provides for multiple use of all lands except firing ranges and other hazardous areas. It also provides measures to combat erosion and poor drainage; water, soil, and air pollution; wildfires; forest insect and disease damage; unproductive wildlife habitat; and damage or loss of vegetative cover.

Preservation of wildlife habitat, especially for endangered species, is an integral part of the conservation plan. Dredging and military training are not permitted in salt marshes, for

Visual indicator measures effect of deer browse on a crabapple tree.



example, because these areas serve as spawning grounds for many species of aquatic life. Endangered species habitat is clearly identified to insure maximum protection.

Fifty-six wildlife food plots supplement natural food supply and enhance brood range. Rye, wheat, and chufa are planted for fall, winter, and early spring grazing. The vegetation on each site is left standing for nesting and feeding throughout the summer.

Well-spaced clearings assure diversity of habitat for many wildlife species. Roads and open areas are seeded to Kentucky 31 fescue and bahiagrass. Autumn olive and other shrubs have been planted in the clearings.

The base has seen a marked increase in wildlife populations, especially deer, turkey, mink, quail, and black bear. Endangered species such as the alligator, osprey, red-cockaded woodpecker, dusky seaside sparrow, and American bald eagle have been sighted during the last several years.

Special efforts are being made to increase the numbers of nongame wildlife. Shrews, bats, jumping mice, and armadillo are among the many species receiving special protection



Military training using amphibious assault vehicles, tanks, and front-end loaders aggravated the soil erosion problem.

and care. A variety of birds flourish in the region, and they, too, are protected. Included are pelicans, herons, sandpipers, owls, tanagers, wood warblers, nuthatches, and wrens.

Conservation education is an important part of training at Camp Lejeune. The base ecologist has given presentations to more than 17,000 students at the Motor Transport School Company, for example, where special emphasis is placed on oil pollution.

Conservation education is also carried into the neighboring community. Under the sponsorship of the Marine Corps Human Relations Program, Marines have constructed nature trails and planted several hundred pine trees for nearby public elementary schools.

Marine Corporal LaLuntas is a writer for the Joint Public Affairs Office, Camp Lejeune, N.C.



Charles Peterson, Camp Lejeune's wildlife manager, and Steve Thomas, North Carolina Wildlife Resources Commission, band a wild turkey that was trapped on the base and will be released in a nearby national forest.



Bobcats are well distributed throughout the 69,312 acres of habitat available to them.

Catfish farming conserves water, makes efficient use of land, and nets a nice profit for two Californians.

Underwater Farming



Johnny and Clarence Fagundes have 120,000 head of livestock under 60 acres of water. The Fagundes brothers farm catfish near Hanford in California's Central Valley.

The Fagundes' catfish operation includes seven fish production ponds, a 3-acre breeder pond to supply fingerlings, and a pay-lake for recreational fishing. The brothers also grow alfalfa, grain, cotton, and kiwi fruit and run a dairy on their 2,600-acre farm.

Water for the fish ponds serves two purposes: First, it is pumped from

deep irrigation wells and circulated through the ponds; then it is returned through a tailwater recovery canal to the concrete-lined irrigation system and piped to the field crops.

Fish production is increased by circulating clean water through the ponds, while crop production is increased by irrigating with warm water that contains fertilizer picked up in the catfish operation.

Originally, the Fagundes brothers did not intend to farm catfish; they wanted to extend their crops onto 500 acres of saline-alkaline land. Cooperators with the Excelsior Resource Conservation District since 1956, they called on the Soil Conservation Service for assistance.

Tests of soil samples showed that the land could not grow crops without 2 to 3 years of expensive soil reclamation measures. The Fagundes then turned to the idea of catfish farming, and SCS technicians helped design the operation and made suggestions for fishpond management.

The Fagundes started catfish farming in 1974 with a 6-acre pond stocked with 7,000 fish. They produced 12,000 pounds of fish that year and netted a profit of \$464 per acre.

The brothers began to build more catfish ponds and to improve the

ponds. In 1975, they cooperated with SCS in a trial planting of five varieties of bermudagrass. The plants stopped bank erosion, which helped clear the water and led to even better fish production.

Last year the Fagundes produced 180,000 pounds of fish from their 60-acre operation, for a net return of \$495 per acre.

The Fagundes also opened their public recreation pond last August. By November, visiting fishermen had caught 18,000 pounds of catfish. They pay 10 cents an inch for their fish, most of which measure 15 to 24 inches long and weigh 1 to 3 pounds.

Eventually, Johnny and Clarence Fagundes plan to expand their catfish farm to 100 acres—and increase their production to 250,000 pounds of fish each year.

Mr. Menezes is civil engineering technician, SCS, Hanford, Calif.



Mike Dennis, soil conservationist in Morgan Hill, Calif., samples water to determine if oxygen content is high enough for fish.

New Publications

Loans to Small Businesses Under the Federal Water Pollution Control Act (92-500)

by the Environmental Protection Agency

The Federal Water Pollution Control Act authorizes loans to assist small businesses in adding to or altering their equipment, facilities, or methods of operation in order to meet water pollution control requirements. The loans are to provide relief to certain small businesses and farmers who might suffer substantial economic injury without financial assistance. They are provided when commercial loan sources are unavailable or can only provide part of the required loan.

This pamphlet explains who is eligible for the loans, what the loans may be used for, and how to apply for them.

Copies are available from the Environmental Protection Agency, Office of Analysis and Evaluation, 401 M Street, SW. (WH-586), Washington, D.C. 20460.

Unique City—Unique Soils

by the New Orleans League of Women Voters and the Soil Conservation Service

This pamphlet describes the problem of soil subsidence facing home buyers, builders, and homeowners in New Orleans, La., and its environs. It also recommends using the cooperative soil survey which shows areas in Jefferson, Orleans, and St. Bernard Parishes that have subsidence problems.

The pamphlet has been translated into Spanish. Copies of both the English and Spanish versions are available from SCS, 3445 N. Causeway Blvd., Suite 401, Metairie, La. 70002.

Meetings:

May

- 8-11 National Forest Products Association, Washington, D.C.
- 8-13 National Council of State Garden Clubs, Inc., Convention, Kansas City, Mo.
- 8-13 The American Water Works Association Conference, Anaheim, Calif.
- 10-12 Conference on Great Lakes Research, Ann Arbor, Mich.
- 23-25 1977 National Conference on Water, St. Louis, Mo.
- 30-
June 3 American Geophysical Union, Washington, D.C.

June

- 4-9 General Federation of Women's Clubs Convention, Seattle, Wash.
- 5-9 American Institute of Architects Convention, San Diego, Calif.
- 6-7 Wood Energy Conference, Atlanta, Ga.
- 6-8 National Wetland Protection Symposium, Reston, Va.
- 10-12 National Audubon Convention, Estes Park, Colo.
- 19-22 National Watershed Congress, Washington, D.C.
- 20-24 Air Pollution Control Association Conference and Exhibition, Toronto, Canada
- 26-29 American Society of Agricultural Engineers, Raleigh, N.C.
- 26-29 American Society of Landscape Architects, Minneapolis, Minn.
- 26-30 American Seed Trade Association, Inc., Louisville, Ky.
- 26-
July 1 National Environmental Health Association, San Diego, Calif.
- 27-29 American Plywood Association, Portland, Oreg.

Index Available

The index for volume 41 of SOIL CONSERVATION (August 1975 to July 1976) is now available. Single copies may be requested from the editor, SOIL CONSERVATION Magazine, Soil Conservation Service, P.O. Box 2890, Washington, D.C. 20013.

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An Easy Selling Job

From the Administrator

Conservation-minded ranchers will accept a sound approach to land management, even when it breaks with custom and tradition.

Coordinated resource plans, or CRP's, represent one such approach. For the past 10 years, such plans have been finding increasing favor with ranchers whose livelihood depends on efficient use of a mix of private and public grazing lands.

State and federal agencies that administer public lands also see coordinated resource planning as an important tool in achieving multiple-use management goals. The Soil Conservation Service is convinced that the process offers one of the best methods available for making SCS technical assistance count in improving grazing land, the largest single land use in America.

A coordinated plan replaces several old conservation or management plans. It covers with a single plan all the public and private parcels of land that a rancher uses, detailing management needs for the whole operating unit. It spells out conservation responsibilities for the management agencies as well as for the rancher, so that they can work together toward common goals.

Plans now in use range from one in South Dakota that coordinates use of scattered small tracts to one in Alaska covering 2½ million acres of federal, state, borough, and private land.

Howard Borgerding's ranching operation, described in the article beginning on page 12, in many ways is typical of the majority of existing CRP's. The local conservation district was the catalyst for developing interest in the concept. The district board also provided a forum for "the fine art of arbitration" that brought together the rancher and the agencies responsible for directing public land use. The plan worked.

In its short history, coordinated resource planning has proved its value for many ranchers and their livestock, for fish and wildlife, and for the long-term conservation of natural resources on public and private lands.

With ranchers' help in showing others what can be accomplished through coordinated planning, we know that more will want its help in strengthening their own ranching operations.

Mel Davis

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Secretary of Agriculture

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Soil Conservation

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Trailblazing and Stream Saving—Thanks to Title X

by F. James Parks

Title X projects have boosted employment in many communities, while giving some local natural resources a new lease on life. Alabama, Michigan, and Pennsylvania are among the states that used Title X funds for conservation programs.



A Title X crew in Pennsylvania works on stream improvement in the Hicks Run watershed. Only natural materials were used and were hand carried to the site.

Cleaner streams and lakes . . . improved parks and recreational facilities . . . more effective flood prevention and erosion control . . . repair of storm and disaster damage.

This is not just a list of conservation goals. It also illustrates the kind of results achieved through Title X projects.

Title X, the Job Opportunities Program, was enacted by Congress in 1974 as part of an effort to assist communities which had high unemployment rates. There was good reason for congressional concern. As late as January 1976, 3.7 million workers in the United States under the age of 25 were unemployed. About one-third of them lived in rural areas.

For more than 3,500 of these idled workers, the "Opportunity" in Title X meant just that. It gave them a new chance to pay their own way. It got many off the welfare rolls. It also stimulated local pride by restoring or protecting natural resources.

During the active phase of the program, a total of 138 projects with conservation objectives were authorized and carried out. They affected communities in 39 of the 50 states.

Projects were funded with "pass-through" money. Funds were appropriated by Congress to the Economic Development Administration (EDA) of the Department of Commerce. For conservation projects, EDA allocated funds to the Soil Conservation Service (SCS) which then made them available to local conservation districts. One limitation on these funds is that at least 70 percent of them must be earmarked for labor—rather than material and equipment—costs.

There was an overwhelmingly favorable response to Title X projects. Here are three of the many local testimonials.

In Alabama, over 500 species of trees, shrubs, and herbs have been planted and labeled with common and scientific names.

Alabama

Thanks to a Title X project, Alabama's Clay County now boasts the Crooked Creek Nature Trail—both a local and a tourist attraction. Along with an 11,200-foot scenic walk, visitors are greeted by clearly marked specimens of trees, shrubs, and herbs that are native to the county. Transplantings are still in progress. When they are completed, more than 500 species will have identification markers.

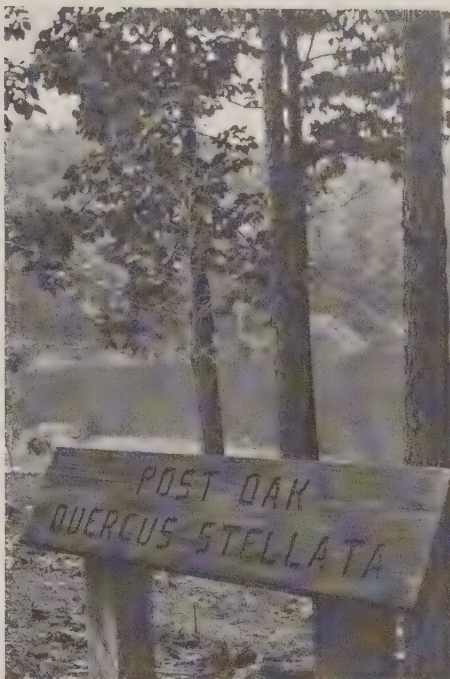
The trail winds along the banks of a multiple-purpose floodwater retarding reservoir in the Crooked Creek watershed—a reservoir built with Public Law 566 small watershed project funds. Hikers can enjoy a picnic lunch and get a lesson in local botany at the same time. Picnic tables, barbecue pits, and benches along the trail provide spots to rest, snack, and enjoy an excellent view of the reservoir and its surroundings.

Further enhancing this natural setting are bridges constructed of logs from trees that were cut to clear the trail; birdhouses made of hollow limbs and small logs; and rustic wood duck nesting boxes. Piles of brush offer cover for wildlife.

The trail is an esthetic achievement for Clay County as well as an economic plus: it has brought \$200,000 into the local economy.

Supervisors of the Clay County Soil and Water Conservation District, who carried out the project, are more than pleased with its impact. "It's one of the best things that could have been done to help the economy," notes Chairman Lewell Sellers. "It helps keep people off welfare."

Residents hired to work on the trail were even more enthusiastic. "There were no jobs until this," said Anna Pearl Houston. "I hauled rock, built nature trails, and watered flowers. I loved the job and just wish it would have lasted forever."



The nature trail was cleared and leveled by hand and covered with crushed limestone.



Maxine Howard and Title X Coordinator Hoyt Mattox enjoy a walk along the trail. Student groups, Scout troops, and the general public are encouraged to use the trail for nature study.



Exercise stations are located along a jogging trail in Michigan. A sign at each station shows joggers how to do the exercise.

Michigan

Another kind of trail—for jogging and recreation—opened last September in Jonesville, Mich., the result of a Title X project carried out by the Hillsdale County Soil Conservation District (SCD). Hillsdale County, with an unemployment rate of almost 17 percent, was one of 10 SCD's in Michigan to receive Title X funds.

The jogging trail—called a “parcours” after similar facilities that have become popular in Switzerland—was started by Sue Carlisle, a teacher at the Williams Elementary School in Jonesville. Carlisle heard about a parcours in Ann Arbor, visited it, and returned to Jonesville with photographs and an idea.

She met with the school board and the recreation committee of the village of Jonesville. The school board agreed that a parcours could be built on vacant land next to the Williams School. The village contributed \$1,000 toward the project but didn't have a labor force to work on it. The Hillsdale County SCD agreed to provide labor under the Title X program.

Thus, an overgrown field, a small woodlot, and a pond became the site for a 1¼-mile parcours in Jonesville.

The facility has proved attractive to both sedentary and active residents in the area. Some find it convenient for a leisurely stroll. The more athletic can vault the logs, scamper up the ramps, jump across the ditch, or visit one of the 19 exercise stations to perform the suggested kneebends and chin-ups.

Jonesville's elementary school children enjoyed the facility so much that a “miniparcours” has been developed for the Williams School playground. Through an organized program, the children can measure their achievement by keeping track of the time they spend on the trail and the number of exercises they complete.

Pennsylvania

For Pennsylvania's Elk and Cameron Counties, recreation was a secondary goal. Resource and wildlife protection came first.

Hicks Run, which flows through a wild and isolated section of both counties, is a good quality native-trout stream. It is part of a watershed which includes wood and hunting lands and is home to Pennsylvania's only elk herd.

A major step toward assuring environmental protection in this area was to reduce the stream's sediment load. Doing this required such improvement devices as channel blocks, jack dams, log crippings, deflectors, and riprap.

Determining what was needed was the easy part. The difficulty was that all of the materials had to be transported to installation sites by hand. That called for a crew of willing workers and cooperation between government agencies, private businesses, and individuals. It all came together under the umbrella of a Title X project.

SCS received \$240,000 in Title X funds from EDA. This money was directed to the Elk and Cameron SCD's for use in administering the work. The Pennsylvania Fish Commission planned and supervised the job. Two other state agencies, the Bureau of Forestry and the Pennsylvania Game Commission, provided the land. The Bureau of Forestry also donated trucks and rock. A private sawmill donated the slabwood needed for stream improvement structures. Because so much of the necessary material and equipment was donated, nearly all the funds were used to create jobs for almost 100 local people.

"Seldom had a more diversified crew been assembled. More than a dozen were on the welfare rolls. About 20 percent had college degrees but were unemployed. Some 15 percent were women. They furnished the hand labor that brought logs, slabwood, tools, and about 20 million pounds of rock to installation sites.

When the project was completed, many of the workers found other jobs. Some returned to college. Said Gordon Beck, a crew foreman, "I've been in construction work for 15 years, and this is the best crew I've ever had."

The money was well spent. According to Paul Gerg, Elk County

coordinator, "A state official told me that, if handled by contract, each structure would cost about \$4,000. We built them for less than \$500 each."

Mr. Parks is a staff writer, Information Division, SCS, Washington, D.C.

Contributing authors: Philip K. Cornelison, district conservationist, SCS, Ashland, Ala.; Roger D. Nanney, district conservationist, SCS, Hillsdale, Mich.; and Frederick W. Bubb, public information officer, SCS, Harrisburg, Pa.



Above, Paul Gerg, Elk County Coordinator, and Bob Mondock and Ron Tibbott, Pennsylvania Fish Commission, examine a completed jack dam on Hicks Run.



At left, log and stone deflectors and a two-stage jack dam (in background) were installed by Title X crews in Pennsylvania.

A Lagoon Grows in Hawaii

by Otis M. Gryde

A new manmade lagoon is marking the first stages of a flood protection plan that already is providing a different kind of recreation to an ocean-oriented community.

It was, no doubt, the first luau ever held in honor of a desilting basin. Yet a hundred windward Oahu residents turned out to help celebrate completion of this first stage of the Kahaluu Watershed and Flood Control Project.

The desilting basin forms a 7.5-acre lagoon that drew crowds of boaters and fishermen as soon as it was completed in late 1976.

"Kids could hardly wait for the lagoon to fill before they were out in all kinds of boats," said State Representative Ralph Ajifu, chairman of the Windward Oahu Soil and Water Conservation District (SWCD).

The lagoon is part of a Public Law 566 project sponsored by the Windward Oahu SWCD and the City and County of Honolulu.

Residents organized to look for a solution to the Kahaluu area's flooding problem on the heels of a series of destructive floods in 1965. "We'd been talking about our flood troubles for years," according to Harry Lau, owner of a local restaurant. "Once floodwaters higher than my waist came pouring across the highway, and a log crashed through my front customer-service window. It'll be nice when we don't have to worry about things like that anymore."

When the Public Law 566 project is finished in about 5 years, the lagoon will have grown to 28 acres and will be surrounded by a 22-acre park with trails, picnic sites, and a boat ramp. The lagoon is also designed to help remove silt from runoff water

before it enters Kaneohe Bay.

Cost of the Public Law 566 project is being shared by the Soil Conservation Service and the City and County of Honolulu. SCS and the Forest Service are providing technical assistance through the Windward Oahu SWCD to help accelerate land treatment measures in the watershed.

In addition to the lagoon features, plans call for:

- Constructing small debris basins at the head of three streams and channel improvement of the streams.
- Planting vegetative cover on old erosion scars, road cuts, and building construction sites to stabilize soil, reduce damage from sediment and runoff, and enhance natural beauty.
- Improving management of land used for crops, pasture, and forests to control soil erosion.

Honolulu's Parks and Recreation Department is meeting with community groups to plan additional recreation facilities for the watershed area.

When complete, the Kahaluu project will provide flood protection and conservation treatment for nearly 4,500 acres of land and, as Ajifu notes, "land is about the scarcest resource we have in the islands."

Mr. Gryde is district conservationist, SCS, Honolulu, Hawaii.



Bermudagrass has been planted on the lagoon's banks and paspalum near the outlet to the saltwater bay.



Far left, floods like this one in 1965 caused residents in the Kahaluu area to seek a way to control flooding. Near left, a desilting basin is the first stage of the flood control project.



Kahaluu youngsters have fun boating in the outlet channel of the lagoon.



Residents of a town in southern Kentucky seldom had enough water to meet their needs. Today, the Mill Creek Watershed Project provides a dependable source of water and flood protection for the area.

by Thomas W. Levermann
and Harold A. Woodward

When Water Came to Town

The Tompkinsville water supply used to dry up periodically—as did the economy of this city in Monroe County, Ky.

“People left, and business and industry refused to locate here,” said Dave Walden, who will soon retire after 32 years as the Soil Conservation Service’s district conservationist in Monroe County. “We just couldn’t grow without water.”

A watershed project changed all that. People are staying now and more are moving in.

The original water treatment plant in Tompkinsville was constructed in the 1930’s. It was designed to serve only about 90 users. By the mid-1960’s, though, it was pumping water to nearly 900 homes and businesses. When demand was too strong, Tompkinsville’s water source, Town Creek, dried up. At those times, a line was run from a 12-acre pond to the water treatment plant. The pond once provided Tompkinsville’s water for an entire summer.

On those few occasions when the community got too much water, flooding caused considerable economic grief. Because the area’s topography is rough, flood damage tended to concentrate on the limited amount of flatland on the valley

One of the many recreational benefits of the Mill Creek Watershed Project is a playground located next to the lake.

The town's former water supply proved inadequate when demand was heavy.



A new water treatment plant was successful in meeting the increased demand.



floors. With average per capita income in Monroe County only about half that of the state average, agricultural and business losses caused by flooding amounted to local disasters.

To do something about the water situation, Tompkinsville and the Monroe County Conservation District asked SCS for assistance under Public Law 566. The Mill Creek Watershed Project included construction of a dam and a 115-acre lake to reduce flooding and give Tompkinsville a more dependable source of water. It also included a community recreation area around the lake, with playgrounds, picnic facilities, and boat docks.

A complete conservation land treatment program for the Mill Creek watershed supported the structural aims. Project costs of nearly \$900,000 for land rights, engineering services, dam design and construction, recreational facilities, fencing, and establishment of vegetative cover were shared by SCS (57 percent), the city of Tompkinsville (22 percent), and the Economic Development Administration (21 percent). Construction began in 1969 and the lake was filled in 1972.

Assisted by SCS and the District, landowners did their part, too. The

number of conservation district cooperators in the watershed area increased from 85 to 215. Conservation cropping systems were planned and installed on 1,800 acres. Hay and pasture seedings were completed on 5,540 acres, trees were planted on 125 acres, and 54,430 feet of underground tile drain was installed. Vegetation was established on 322 acres of critically eroding areas. Seventy-three farm ponds and 7,500 feet of terracing also were installed.

These measures reduced soil erosion, while increasing crop yields and profits for the rural landowners. They helped assure the lake would be silt-free for many years, thus reducing maintenance costs and improving the water quality. Elimination of the flooding problem has brightened the agricultural outlook for Monroe County. And local businesses, industries, and homes are assured of adequate fire protection.

Sewage and water treatment plants brought new life into the 150-year-old town. The city purchased a 35-acre industrial site. A local cheese plant doubled its production capacity and brought in many new employees. Two clothing manufacturers and two pallet plants began

operation. Almost \$4 million worth of new construction included a vocational and elementary school, a city library, a football stadium, several homes and apartments, and a 64-unit low-income housing development. The high school was enlarged and the hospital added 20 beds. Another doctor and another dentist moved into the area.

A rural water district also will soon begin supplying water to 500 people in the town of Gamaliel, 8 miles south of Tompkinsville. Two more rural water districts are planned.

Kenneth Bartley, president of the Tompkinsville Chamber of Commerce, credits the watershed project with bringing new growth to the city. "I'd say 500 people have moved in since the water came," he says. "These new residents bring their money into town and pay taxes. This has been a real stimulus to business in the area."

Mr. Levermann was public information officer, SCS, Lexington, Ky. He is now an educational relations specialist, Information Division, SCS, Washington, D.C.

Mr. Woodward is visual information specialist, SCS, Lexington, Ky.

A Better Brand of Range Management



A rancher in Oregon uses his Coordinated Resource Plan to build a profitable business while improving natural resources on land that was "grubbed out by sheep" when he bought it.

by Henry C. Wyman

Former Navy fighter pilot Howard Borgerding finds the systematic approach the best way to get things done.

During a decade of ranching in northeast Oregon, he has become Wallowa County's leading advocate of a systematic technique for natural resource management—the Coordinated Resource Plan (CRP).

Like many westerners, Borgerding grazes his stock partly on his own land and partly on lands administered by agencies such as the Bureau of Land Management, USDA's Forest Service, and various departments of state government.

Before coordinated resource planning came along, ranchers operating on "checkerboards" of intermingled public and private land found themselves trying to juggle a half-dozen management and conservation plans, Borgerding recalls.

"We might have two forestry plans,



One of the major benefits of the CRP approach is that it reveals conflicting requirements of the various land uses involved and helps assure that the conflicts are resolved.

a couple of wildlife agreements, two conservation plans, and an assortment of management charts and maps," Borgerding said. "Lack of consistency caused some headaches: A pasture labeled 'B' on one plan would be labeled '7' on another and would be combined with two more pastures on another plan."

A Coordinated Resource Plan provides a single, overall, long-term plan for managing and improving an entire ranching unit. The rancher and the agencies are parties to the plan, which incorporates all parts of the operation—the rancher's own property and land used under agreements with state or federal agencies. The CRP process also reduces the chance of overlooking

prospective multiple uses of land, regardless of ownership.

The need for better range management led to most of the CRP's in use today. More and more plans, however, are being developed with timber harvesting, fisheries, and wildlife habitat as the primary resource management concerns.

Each plan is prepared by a group that includes those responsible for managing all segments of land involved. Also on the team are conservation district and Soil Conservation Service representatives and other resource management advisors. The plan includes basic soil and water inventories that describe the existing resource situation and an outline of potentials for effective development.

About 60 acres of 'Latar' orchardgrass and clover pasture have replaced scoured, weedy bottomland along Big Sheep Creek.



The landowner and land-management agencies agree on a single plan that covers all the land, public and private, that the rancher uses.

One of the major benefits of the CRP approach, Borgerding notes, is that it reveals conflicting requirements of the various land uses involved and helps assure that the conflicts are resolved.

"You've got different people with different ideas about how to handle the resources," said Borgerding. "You've got wildlife people, forestry people, soil conservationists, and ranchers. You talk together, work out the differences, and make the agreement formal."

Borgerding, who describes himself as "pretty methodical about a lot of things in life," started careful planning to become a cattle rancher well before he retired as a jet pilot in 1966. He picked his Oregon site after visiting four western locations chosen with the help of a computer.

Coordinated resource planning has proved more thorough, effective, and economical than other types of resource planning efforts for ranching operations.

Beginning with selected data (temperature, rainfall, topography, streamflow, and elevation) on dozens of prospective ranching areas, Borgerding used his own specially designed computer program to locate those that best met his "ideal" criteria.

"I wouldn't recommend such an effort to anyone else, but I was studying computers and needed a project," Borgerding recalled. "When my wife and I checked out the four spots that led the list, we reverted to the more conventional methods of selecting farm property: looking over soil surveys, schools, livestock marketing facilities, and so on."

In 1966, the new rancher became a cooperator of the Wallowa Soil

and Water Conservation District (SWCD), saying that he hoped to build the property into "a profitable and enduring" livestock operation. "The first thousand acres we bought were absolutely grubbed out by sheep overgrazing," he recalls. "We didn't graze much for the first 3 years; then after several years of proper grazing, native perennials like bluebunch wheatgrass and Idaho fescue started coming back."

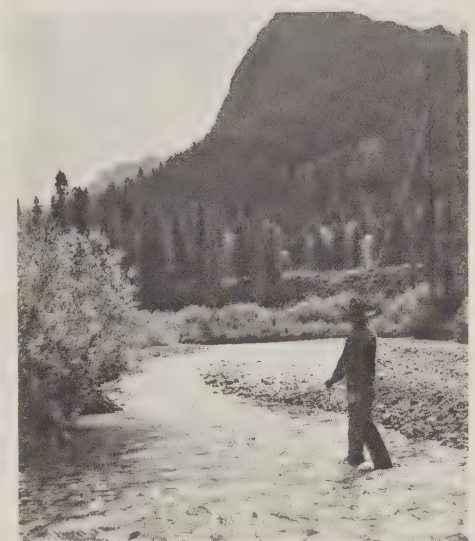
Today, the Borgerding family owns 8,400 acres—now called "Courthouse Ranch"—and uses an additional 17,000 acres under permit from the Forest Service, paying a grazing fee for each animal unit.

Coordinated resource planning has proved more thorough, effec-



Borgerding's improved irrigation system provides one of the keys to better management of 400 acres of the rancher's most productive land.

Vegetation plantings and other streambank stabilization work outlined in the Coordinated Resource Plan improve habitat for steelhead and Chinook salmon by protecting spawning beds and maintaining water depth and quality.



tive, and economical than other types of resource planning efforts for ranching operations. One Oregon study showed 40 percent more conservation applied to land under coordinated plans than to similar land under conventional management and conservation plans.

Borgerding credits his CRP with providing a logical, step-by-step method of building a profitable business while improving the natural resources upon which the business depends. "You can do about anything to the land for a year or so and get by; but if you abuse it for long, the weeds take over and erosion sets in," Borgerding said.

About 400 acres of Borgerding's best land and the Courthouse Ranch headquarters straddle Big Sheep Creek at the bottom of the steep-walled canyon. Along the creek, which used to flood its banks each spring, Borgerding has reclaimed 60 scoured acres of rocky weed

"You can do about anything to the land for a year or so and get by; but if you abuse it for long, the weeds take over and erosion sets in."

patches and fenced them into eight meadows. The meadows, seeded to 'Latar' orchardgrass and clover, have been built up over the years by applying silt-laden creekwater through an improved irrigation system. "I called it my little Nile River project," Borgerding grinned. "But it isn't working as well anymore because plantings along Big Sheep have stopped bank erosion and the creek is running clear again."

While somewhat hampering his reclamation efforts, the rancher's streambank stabilization work is benefiting steelhead and Chinook salmon in Big Sheep Creek, one of the area's important spawning streams. His improvements help protect spawning beds, maintain water

quality, and assure a more constant water depth.

On the other land he uses, Borgerding has built and improved about 60 water developments and ponds. He also has followed a planned grazing system aimed at "improving the range, forestry, wildlife, watershed, and recreation resources."

Now, the 56-year-old rancher looks forward to "fine tuning the operation" with his Coordinated Resource Plan. The plan states that an important objective is to increase his 500 cow-calf units to 750 and his yearlings from 475 to 700. That will require more summer range and an improved grazing system on his own land and on the nearby lands ad-



A variety of wildlife, large and small, gets special consideration at Courthouse Ranch.

More than 60 water developments help assure effective grazing distribution of public land used under permit from the Forest Service.



ministered by the Forest Service. The CRP calls for more fences and stockwater ponds for more effective grazing distribution. Additional meadows along the creek will be leveled, seeded, and irrigated.

The Forest Service agrees, as part of the CRP, to seed any areas disturbed by timber sales. And, by agreement with Oregon Department of Fish and Wildlife representatives on the planning group, Borgerding will seek a more compatible balance between numbers of big game and cattle. The plan also includes provisions for improving habitat for game birds such as chukar, huns, and quail.

Like most CRP's, Borgerding's plan is reviewed each year by the planning group and is revised to reflect changed resource conditions, livestock needs, and the rancher's desires.

In 1974, Borgerding was elected to the Wallowa SWCD board of

directors and joined the district's campaign to encourage coordinated resource management. According to Don Baldwin, district conservationist at Enterprise, Borgerding's plan is one of 15 covering 220,000 acres in Wallowa County.

"A rancher who doesn't plan and operate with soil and water conservation in mind will end up spending most of his time correcting mistakes," said Borgerding. "We've found that the best way to sell the coordinated resource management idea to another rancher is to show him a plan like mine—one that's really working and that's resulting in improved conservation."

Mr. Wyman is chief, conservation news & reports branch, SCS, Washington, D.C.

Borgerding conducts annual tours for other ranchers and environmental group representatives to show how coordinated resource planning works.



Bluebunch wheatgrass range site is kept in good condition by use of a planned grazing system covering the rancher's own land and 17,000 acres of public land.



Borgerding works with District Conservationist Don Baldwin (left) in carrying out provisions of his Coordinated Resource Plan. The plan is reviewed each year by Borgerding and the state and federal agency team members.

Energy + Environment = Montour Preserve

An energy production facility coexists peacefully with outdoor recreation, wildlife, and farming in the Pennsylvania countryside.

by Harry T. Barnes, Jr.,
and Henry A. Levandoski

Some people may think that energy production and environmental quality don't mix. Officials of the Pennsylvania Power and Light Company (PP&L) wouldn't agree. They believe that higher energy production goals can be met without causing irreparable harm to the surrounding countryside.

With this in mind, PP&L created Montour Preserve—1,000 acres of natural woodland, nature trails, outdoor recreation facilities, and wildlife refuges—located next door to its coal-burning electric generating station near Washingtonville in north-central Pennsylvania's Montour County.

The cooling water source for the generating station is the Susquehanna River, 10 miles away. River water is drawn to the station by a very efficient pumping station and pipeline. However, PP&L needed an additional source of water in case mechanical breakdowns or low river water should cut off its Susquehanna supply. So it built a 165-acre reservoir, Lake Chillisquaque, nearby.

The reservoir and its environs are a made-to-order setting for outdoor recreation, wildlife refuges and nesting facilities, and community

programs concerned with environmental awareness and resource conservation. Recognizing this, company officials incorporated these features into a master plan for developing the area's natural resources. The plan was drawn up by PP&L's conservation and land management staff with assistance from the Montour Conservation District (CD) and the Soil Conservation Service. It covers about 5,000 acres owned by the company—the 1,000 acres on which Montour Preserve is located and 4,000 acres surrounding it.

Many of the plan's objectives have already been realized. Canoes, rowboats, sailboats, and small electric motorboats cruise the waters of Lake Chillisquaque. Picnickers relax in spacious pavilions. Shutterbugs carry their cameras to the scenic overlooks.

Hundreds of animal and bird species inhabit two wildlife ponds and the lands around them. Muskrat, deer, and at least 213 species of birds make Montour Preserve their home.

Community groups such as Scout troops and 4-H clubs travel as far as 50 miles to the preserve to take part in environmental education programs



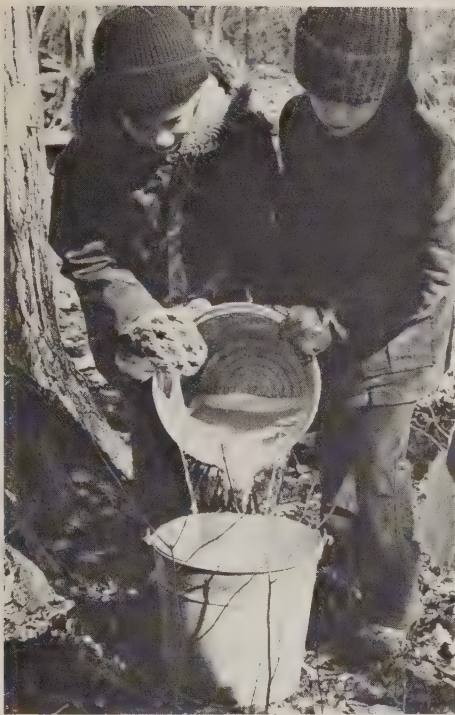
Harry T. Barnes and two young visitors discover what's below the lake's surface during an environmental study session.

including forestry and wildlife management, pond ecology, and plant and animal identification. The programs operate out of the preserve's Visitors Center. PP&L encourages instructors of classes from kindergarten through college to use the preserve's environmental study areas for their own programs.

One "classroom" is the Goose Cove wildlife refuge area, which contains an observation building and blind for nature study and photography. Another is the Goose Woods nature trail, for which a self-guiding trail booklet has been developed.

Still another is the Goose Woods "sugar bush," where maple trees are tapped and maple syrup made. This is one of the most popular outdoor laboratories at the preserve. School children have the opportunity to take part in every facet of "maple sugaring" from tapping trees to collecting sap and operating the evaporators, to tasting the final product. Of archeological interest is the Devonian shale pit, which holds fossil evidence of life forms from a sea that covered Montour County more than 400 million years ago.

On the 4,000 acres outside the preserve, farming and hunting are the



Above, children get an onsite lesson in making maple syrup.

Below, John Weaver, Pennsylvania waterways patrolman, instructs visitors in the art of ice fishing.



principal activities. Twenty-seven tenant farmers lease about 2,500 of these acres to grow corn, oats, wheat, barley, and other field crops. Hunters roam some 2,100 acres during specified seasons.

The control center for all of these activities is a century-old Victorian farmhouse, restored and converted into office space. It houses naturalist-director Harry T. Barnes and his staff of three full-time employees.

SCS works with PP&L, the Montour CD, and various conservation agencies to develop and implement plans for the preserve.

SCS helped plan the outdoor recreation areas and helps tenant farmers by providing soils information and designing drainage and erosion control measures.

Plans for future work include demonstration areas which will serve as showcases for forestry, wildlife, farming, and soil and water conservation.

Mr. Barnes is naturalist-director, Montour Preserve, Pa.

Mr. Levandoski is information specialist, PP&L, Allentown, Pa.



Above, the Pennsylvania Fish Commission stocks the lake with a variety of fish including largemouth bass, northern pike, and panfish.



At left, a restored Victorian farmhouse serves as headquarters for the preserve and a modern Visitors Center (background) is a base for conservation education programs.

Photos courtesy Pennsylvania Power and Light Company and USDA.



A Full-Service Watershed

To campers, hikers, and anglers in central Louisiana, the Bayou Boeuf-Rapides Watershed Project is a 236,000-acre playground.

The project contains three lakes and enough recreation area to accommodate about 500,000 visitors a year. But it's more than simply a magnet for people who enjoy water sports and the outdoors. It also supplies irrigation water to more than 35,000 acres of rich Red River bottomland. And by attracting hundreds of new residents and businesses every year, it contributes to a healthy economy in the area it serves.

The National Watershed Congress noted all these achievements in 1975, when it picked Bayou Boeuf-Rapides as its Watershed of the Year.

Cotile, Indian Creek, and Kincaid—the Public Law 566 project's three lakes—draw thousands of swimmers, boating enthusiasts, and fishermen. In combination, the three bodies of water cover almost 6,000 acres. Completion of the playground adjacent to Kincaid Lake will bring the total recreation space near the water to about 1,900 acres.

Helping to maintain a dependable water supply within the project is a series of low-level weirs—or concrete

By maintaining a dependable supply of high-quality water for recreation, agriculture, and business, the Bayou Boeuf-Rapides Watershed Project boosts the prosperity of central Louisiana's economy.

dams. Behind each weir is a pool-like expanse of impounded water that is ideal for fishing and vital to agriculture.

Fishermen can try their luck at catching a few of the bluegill and redear bream, black crappie, and largemouth bass, with which the waters of the area have been stocked. Farmers can use the impounded water for irrigation. Louis Marien, who raises corn within the area served by the project, reports that he now gets 20 more bushels per acre from land that is irrigated.

Area commerce also is thriving. Millions of dollars have already been spent on recreation enterprises, as well as on homes and camps. New businesses—such as grocery stores and boat houses—are finding the area a profitable place to locate.

Resource conservation continues to be a basic ingredient in the project's development. With assistance from the Soil Conservation Service, district cooperators have planted trees and grass, built erosion control structures, and practiced crop residue management. Land treatment maintains water quality and protects the land.

Credit for the watershed's suc-

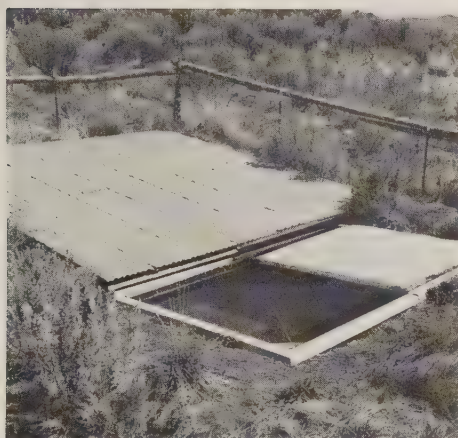
cess belongs to a variety of agencies, organizations, and individuals. Among them are the sponsors: the Rapides Parish Police Jury (similar to county commissioners in other states) and the Lower West Red River Soil and Water Conservation District. The Louisiana Forestry Commission and USDA's Forest Service provided forest land. SCS gave financial and technical help, while cooperating with the Louisiana Department of Public Works in planning and surveying.

The people of Rapides Parish taxed themselves more than \$2 million for the project. Their reward: an improved lifestyle in a "Watershed of the Year." Said Richard Thompson, past-chairman of the State Soil and Water Conservation Committee, "We are now benefiting from more than \$11 million worth of resource development for a better quality of life."

Mr. Warren is public information officer, SCS, Alexandria, La.

The arid northwestern corner of Utah has not always been a hospitable place for wildlife. Watering facilities in the Blue Creek-Howell watershed are changing that.

Oases for Wildlife



Water is far from abundant in the northwestern corner of Utah. Outside of a few irrigated areas, the countryside is particularly dry during the late summer. That's when wildlife in the rugged, rolling hill country of Box Elder County find life especially difficult.

But wildlife watering facilities installed in the Blue Creek-Howell watershed are changing things. Now, upland game birds and other wildlife can get water when they need it at 20 different locations.

The watering facilities are part of the Blue Creek-Howell Watershed Project. This project was sponsored by area landowners and the Northern Utah Soil Conservation District with technical assistance from the Soil Conservation Service under Public Law 566. Of the

project's 115,500 acres, only 3,000 are irrigated—with water from Blue Creek Springs, the only "live" water supply. Also within the watershed are 39,800 acres of rangeland and 72,700 acres of dry cropland.

For wild birds, the dry season comes at a critical time. This is when young birds are first off the nest and require water several times a day. In the past, the lack of water resulted in low brood survival rates in some areas.

The Utah Division of Wildlife Resources designed and installed the 20 watering facilities in the foothills bordering the croplands on a cost-share basis with SCS.

A typical watering structure consists of a fiberglass storage tank with a corrugated metal catchment apron. The apron catches rainfall and funnels it into the tank. When filled, each tank holds 1,000 gallons. A fence around the entire structure protects the fragile aprons from damage by livestock while still allowing wildlife to get in.

Originally, the facilities were intended for upland game birds like the ringnecked pheasant, chukar, and Hungarian partridge. However, spot checks by the Division of Wildlife Resources indicate that even larger numbers of other species are dropping in for an occasional drink. They include mourning doves, mule deer, badgers, and a variety of songbirds.

The facilities are proving to be a good investment. Already, the Division of Wildlife Resources is making plans to install others at several locations throughout the state.

Mr. Chalk is biologist, SCS, Salt Lake City, Utah.



The scarcity of water in northern Utah has made life difficult for wildlife. Watering facilities, installed in the area, can hold up to 1,000 gallons. A catchment apron (top photo) funnels rainfall into a fiberglass storage tank.

Reviews

Our Soils and Their Management.

Roy L. Donahue, Roy H. Follett, and Rodney W. Tulloch, 1976. Fourth edition. Interstate Printers and Publishers, Inc., Danville, Ill. 791 pp., illus. \$15.35; \$11.50 with educational discount.

This textbook presents basic information on soils management. It is intended for high school students studying advanced vocational agriculture and students enrolled in a 2-year program of post high school study. The text is clearly written and well organized. Each of the 22 chapters begins with an outline of topics and ends with a summary, study questions, exercises, and a list of references.

This book covers basic principles of soil management for most segments of agriculture. It is useful as a basic text although some technical information is oversimplified. In chapter 2, "Soils and Their Environment," for example, soil genesis and formation; physical, chemical, and environmental properties; and soil classification are covered in only 20 pages.

Chapter 3, "Soils and Land Use," is a timely discussion of the concepts of land use planning, the need for establishing priorities in the allocation of prime farmland, and the value of soil survey reports. It also briefly discusses managing soil for nonagricultural uses. Chapter 14 discusses land judging for homesites. And chapter 22 discusses vegetating disturbed areas.

"Our Soils and Their Management" is a valuable text for agriculture students and agricultural technicians and aides.

—Oliver R. Carter, soil scientist, SCS, Hyattsville, Md.

Properties and Management of Soils in the Tropics.

Pedro A. Sanchez. 1976. John Wiley and Sons, New York. 618 pp., illus. \$25.

This is a comprehensive, informative, and up-to-date book on the soils in the Tropics. Sanchez objectively tells how the properties of these soils relate to their management for crop production.

Special chapters pertain to shifting cultivation, wetland rice production, multiple cropping, and pastures. Although this book is not about soil classification, he stresses its importance. In most places, he indicates the kinds of soils in terms of the U.S. "Soil Taxonomy." Illustrations include maps, graphs, and charts.

Sanchez drew on his extensive experiences in the Tropics and an impressively large number of references. Literature cited is listed at the end of each chapter.

—Arnold C. Orvedal was formerly soil scientist, SCS, Washington, D.C., and is now retired.

Glossary of Terms Used in Pasture and Range Survey, Research, and Management.

Kamal Ibrahim, Food and Agriculture Organization of the United Nations. 1975. Unipub, New York. \$11.50 paper.

This is a glossary of range management terms used by range scientists and managers in the Western Hemisphere, Europe, and Africa.

Because the science of range management involves many disciplines, including plant ecology, animal husbandry, and resource management, the technical terms can be confusing. This glossary provides ready access to a universal set of definitions, especially for ecological terms used in North America and Europe.

The author compiled terms from several widely used glossaries. He also included simplified definitions for other terms to make them more meaningful to range people worldwide.

This glossary will be helpful to range scientists and managers even though many of the definitions are brief and some of the references are outdated. For example, the Society for Range Management's "Glossary of Terms Used in Range Management" was revised in 1974, but the author cites the 1964 edition.

Range scientists, conservationists, land managers, and students will find this glossary useful.

—Gary R. Evans, range conservationist, SCS, Washington, D.C.

New Publications

Drought Assistance

from the U.S. Department of Agriculture and cooperating agencies

This pamphlet explains what assistance is available from USDA for farmers, ranchers, and others in designated emergency drought impact areas.

Assistance includes grants and loans by the Farmers Home Administration, cost sharing for conservation measures from the Agricultural Stabilization and Conservation Service, and technical assistance and information about water-saving practices by the Soil Conservation Service.

The pamphlet tells the type of assistance available, who is eligible for it, and where it can be obtained.

Single copies are available from local conservation district offices or from the Information Division, Soil Conservation Service, Room 0054-S, Washington, D.C. 20013.

SCS and Architect-Engineer Services

by the Soil Conservation Service

This brochure explains how SCS helps individual landowners, communities, and local and state governments throughout the United States plan, design, and install engineering structures for managing land and water resources.

It tells about SCS work, identifies the kind of structures and practices commonly installed, and tells how to apply for architect-engineer contracts under SCS programs.

Single copies are available from local conservation district offices or from the Information Division, Soil Conservation Service, Room 0054-S, Washington, D.C. 20013.

Keeping Commissioners Current

by Lynn Betts

Soil erosion, herbicide performance, conservation tillage research, the energy situation, "208" planning, and new mining regulations: All are issues that concern conservation leaders in Iowa. And all were discussed in January at a 2-day briefing for district commissioners at Iowa State University (ISU).

Similar programs have been held annually—usually on the Ames campus—for the past 32 years. Only the agenda is completely new every year.

Called the "Short Course for Soil Conservation District Commissioners," it supplements information presented at statewide and regional district meetings. "We try to help bring the latest information on soil conservation and agriculture to the commissioners," says Dr. Min Amemiya, who develops the course.

Besides the latest word on technical and legislative developments, research programs, district programs, and district relationships with other agencies and groups, the course provides helpful tips on producing and marketing crops and livestock.

The course is offered through the university's short course program, with ISU staff serving as instructors for many of the topics. Other instructors include legislators, agency officials, and news media representatives. A member of SCS—from either the Midwest Technical Service Center or national office—also addresses the group.

SCS cooperates with the university in planning and developing the course along with the Iowa Department of Soil Conservation, State Soil Conservation Committee, Iowa Department of Agriculture, and the Iowa Association of Soil Conservation District Commissioners.

Mr. Betts is public information officer, SCS, Des Moines, Iowa.

Meetings:

June

- 4-9 General Federation of Women's Clubs Convention, Seattle, Wash.
- 5-9 American Institute of Architects Convention, San Diego, Calif.
- 6-7 Wood Energy Conference, Atlanta, Ga.
- 6-8 National Wetland Protection Symposium, Reston, Va.
- 10-12 National Audubon Convention, Estes Park, Colo.
- 19-22 National Watershed Congress, Washington, D.C.
- 20-24 Air Pollution Control Association Conference and Exhibition, Toronto, Canada
- 26-29 American Society of Agricultural Engineers, Raleigh, N.C.
- 26-29 American Society of Landscape Architects, Minneapolis, Minn.
- 26-30 American Seed Trade Association, Inc., Louisville, Ky.
- 26-
July 1 National Environmental Health Association, San Diego, Calif.
- 27-29 American Plywood Association, Portland, Oreg.

July

- 1-4 Izaak Walton League of America, Atlanta, Ga.
- 14 Forage Legume Conference, Ardmore, Okla.
- 16-20 American Association of Nurserymen, Inc., Convention, Seattle, Wash.
- 23-27 National Association of Counties, Detroit, Mich.
- 24-28 National Federation of Business and Professional Women's Clubs, Inc., Louisville, Ky.
- 25-28 The Fertilizer Institute Trade Fair and Fertilizer Conference, Kansas City, Mo.
- 31-
Aug. 3 American Agricultural Economics Association, San Diego, Calif.

August

- 7-10 Soil Conservation Society of America, Richmond, Va.
- 15-18 National Farm and Power Equipment Dealers Association, St. Louis, Mo.
- 17-19 Highway Geology Symposium, Rapid City, S. Dak.
- 21-26 American Institute of Biological Sciences, East Lansing, Mich.

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The Plains: A Sense of Urgency

From the Administrator

During droughts, people call it "The Great American Desert" or "Dust Bowl" or a "disaster area."

When there is adequate moisture, it's known as "the breadbasket of the world."

The people who live there call it the Great Plains. Even in good years, it doesn't rain much; normal precipitation is in the 12- to 24-inch range annually, and in drought years, it may fall to 60-75 percent of normal. The fragile soils blow easily when dry and unprotected.

Then why farm the Plains? Because the Plains is located in one of the three great wheat-producing areas of the world, and is perhaps the most dependable of the three. We cannot afford not to farm the Plains; America needs its production and so does much of the world.

But can we grow wheat in the Plains and still protect the soil? The answer is a qualified "yes." Millions of acres there can be farmed without damage to the resources and the environment if proven conservation techniques are followed. Millions of additional acres are better off as grassland, producing needed livestock products instead of unwanted soil and water problems. Many of those acres already have been returned to grass. More should be.

A valuable tool for achieving both goals—applying more soil and water management to farmland and returning "difficult acres" to grassland—is the Great Plains Conservation Program (GPCP). Since 1956, this unique program has made cost-sharing assistance and technical help available through 3- to 10-year contracts with Plains farmers and ranchers.

GPCP helps farmers and ranchers prepare for the inevitable drought so they can keep their resources and their livelihood intact until nominal moisture returns.

For the past 2 years, many parts of the Great Plains once again have suffered severe drought. Producers who have made headway under GPCP contracts survived the drought better. But nearly 8 million acres of land in the Great Plains was damaged by wind erosion this year—up almost 2 million acres over the year before.

This experience should give all Americans a renewed sense of urgency about increasing conservation efforts in the Plains. We cannot afford to let this valuable region blow away; the land and its people mean too much to everyone.

Mel Davis

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Bob Bergland
Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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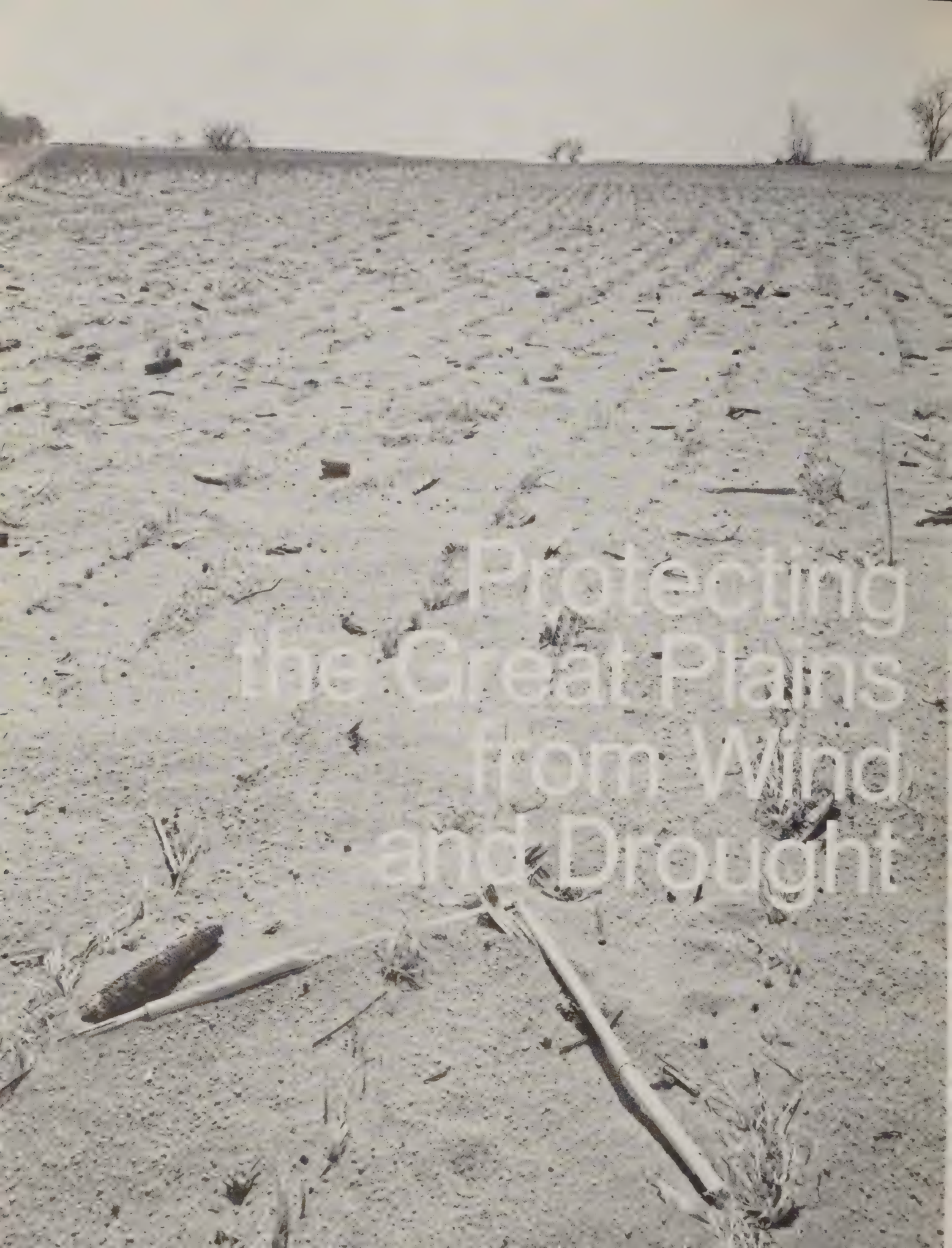
Cover:

Where the soil is not protected on the Great Plains, the hazard of erosion is severe. It can be controlled by contour stripcropping, terracing, and other conservation practices. See pages 4 through 9. (Photo, Gene Alexander.)

Soil Conservation

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Protecting the Great Plains from Wind and Drought



At left, North Dakota field windbreaks and stripcropping and, below, Nebraska contouring and terracing are conservation practices that help protect Plains soil.



For years farmers and ranchers in the Plains states have been challenged by the climate and soil. Today many are discovering that a "conservation package" brings them closer to a permanent solution for their special problems.

by Barbara L. Maus

A field of wheat in Nebraska shows the challenge of climate and soil that Great Plains farmers and ranchers face.

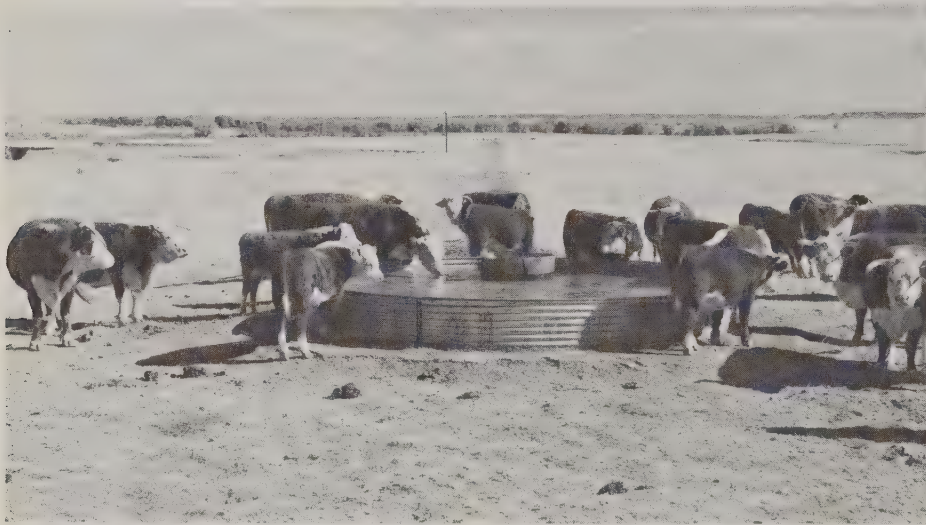
Many see it as the most beautiful and productive land in the world, while others recall it with personal memories of waste and desolation. It is the Great Plains, a vast, semiarid area that cuts through 10 states—Texas, New Mexico, Oklahoma, Colorado, Kansas, Nebraska, Wyoming, South Dakota, North Dakota, and Montana—and extends northward into Canada.

It is a place where vagaries of weather have spelled prosperity and disaster. When rain falls, crops and grass grow. When drought and 50-mile-an-hour winds wage war on the land, the soil blows, crops are destroyed, and it may take a farmer more than a decade to recover his losses.

This year marks the 21st anniversary of the Great Plains Conservation Program (GPCP)—an effort aimed at solving problems resulting from drought and the cultivation of land unsuited for sustained crop production.

Conservation districts in the Plains states helped design the program in the early 1950's, and in 1956 it became Public Law 1021. Under the voluntary program, Great Plains farmers and ranchers receive tech-

Below, properly locating water facilities helps distribute grazing to provide better grass cover. Near right, Colorado District Conservationist Donald Barker examines stubble mulching which leaves a protective cover on the soil. Far right, shrub windbreak in this North Dakota wheat field protects the soil and crop from high winds.



nical and financial assistance which enables them to make needed adjustments in land use and to install conservation measures on their land. The program is administered by the Soil Conservation Service through local conservation districts.

James D. Abbott, SCS assistant state conservationist in Texas, was the contracting officer who signed one of the nation's first GPCP contracts on December 18, 1957.

"In those early days," he explained, "our major effort was to encourage the return of unsuitable cropland to grassland. But today our work is much broader in scope. Our aim is to conserve almost all of the natural resources in the region."

To qualify for GPCP cost sharing, farmers and ranchers agree to adopt a "conservation package"—a comprehensive plan for an entire farm or ranch. They may choose from 32 conservation practices in making up their package. An exact schedule is developed, and the landowner then contracts with the Secretary of Agriculture to finish the work within 3 to 10 years.

Farmers and ranchers are helped by SCS technical specialists as the need arises and receive the Federal

share of the cost—up to 80 percent—as each conservation practice is completed.

The precision planning is paying big dividends. Each dollar of Federal cost sharing produces nearly \$4 of increased annual agricultural income in the Great Plains, according to a 1974 SCS study. In that year the program generated an additional \$43.7 million in agricultural income above that which would have been realized had the cost-shared conservation program not existed.

But what does all of this mean in practical, everyday farming and ranching terms? The benefits to the land have been manifold. They include protected and improved cropland, reduced wind and water erosion, improved range, dependable water for livestock, savings in scarce irrigation water, and a more beautiful countryside.

Landowners say the GPCP gives them the means to soften the punch of climatic extremes. Summer temperatures in the Plains are generally high, sometimes exceeding 100 degrees. Precipitation is relatively light, averaging 20 inches a year. When it is lighter than usual, there is drought. Usually some part of the Great Plains

is affected by drought every year. During these long, dry periods, millions of acres have been damaged, some severely, by wind erosion.

The result is that many areas cannot be farmed safely, and others can be farmed only with intensive measures to conserve soil and water. The Great Plains Conservation Program is especially tailored to these conservation needs. In the two decades since its inception, farmers and ranchers have applied:

- 2,429,381 acres of permanent vegetative cover.
- 958,486 acres of field and wind stripcropping.
- 169,163 acres of contour stripcropping.
- 1,945,975 acres of reestablished grasslands.
- 41,766 acres of trees or shrubs established as windbreaks.
- 81,195 miles of terraces.
- 5,376,083 acres of brush control.
- 9,044 miles of pipelines to provide water for livestock grazing lands.

Conservation Aids South Dakota Ranchers During Drought

A study recently completed by the Soil Conservation Service indicates that South Dakota ranchers who participate in the Great Plains Conservation Program are better able to sustain their livestock enterprises during drought.

The study, made in response to a request by South Dakota Governor Richard F. Kneip, assesses the effectiveness of the GPCP in 47 drought-stricken counties throughout the state.

An analysis of 418 farms and ranches—half with conservation contracts and half without—shows that about 35 percent more of the farmers and ranchers with completed GPCP contracts had adequate hay, pasture, and water supplies than those who did not participate.

Among nonparticipants:

- 41 percent more required emergency pasture.
- 51 percent more had inadequate hay supplies.
- 30 percent more required emergency hay.
- 43 percent more had inadequate water supplies.
- 10 percent more decreased the size of their livestock herds.

The study also reveals that on land not under GPCP contract, 36 percent more acres of grassland are overgrazed, and 38 percent more acres of cropland have moderate to severe wind erosion damage.



The various combinations of cost-share conservation practices have resulted in an estimated soil erosion reduction of 240 million tons annually at a cost of 5.19 cents per ton of soil controlled.

"Farmers and ranchers with GPCP contracts suffer much less when drought comes," said Abbott, "but we're not nearly through with this job. Nearly 200 million acres need conservation treatment in the Plains. Only 94 million acres are now under GPCP contract."

Drought and wind in 1975 and 1976 proved that no conservation program can be perfect. Seven million acres were damaged in the 10 Plains states last year. An additional 10.5 million acres were in condition to blow at planting in the spring of 1977.

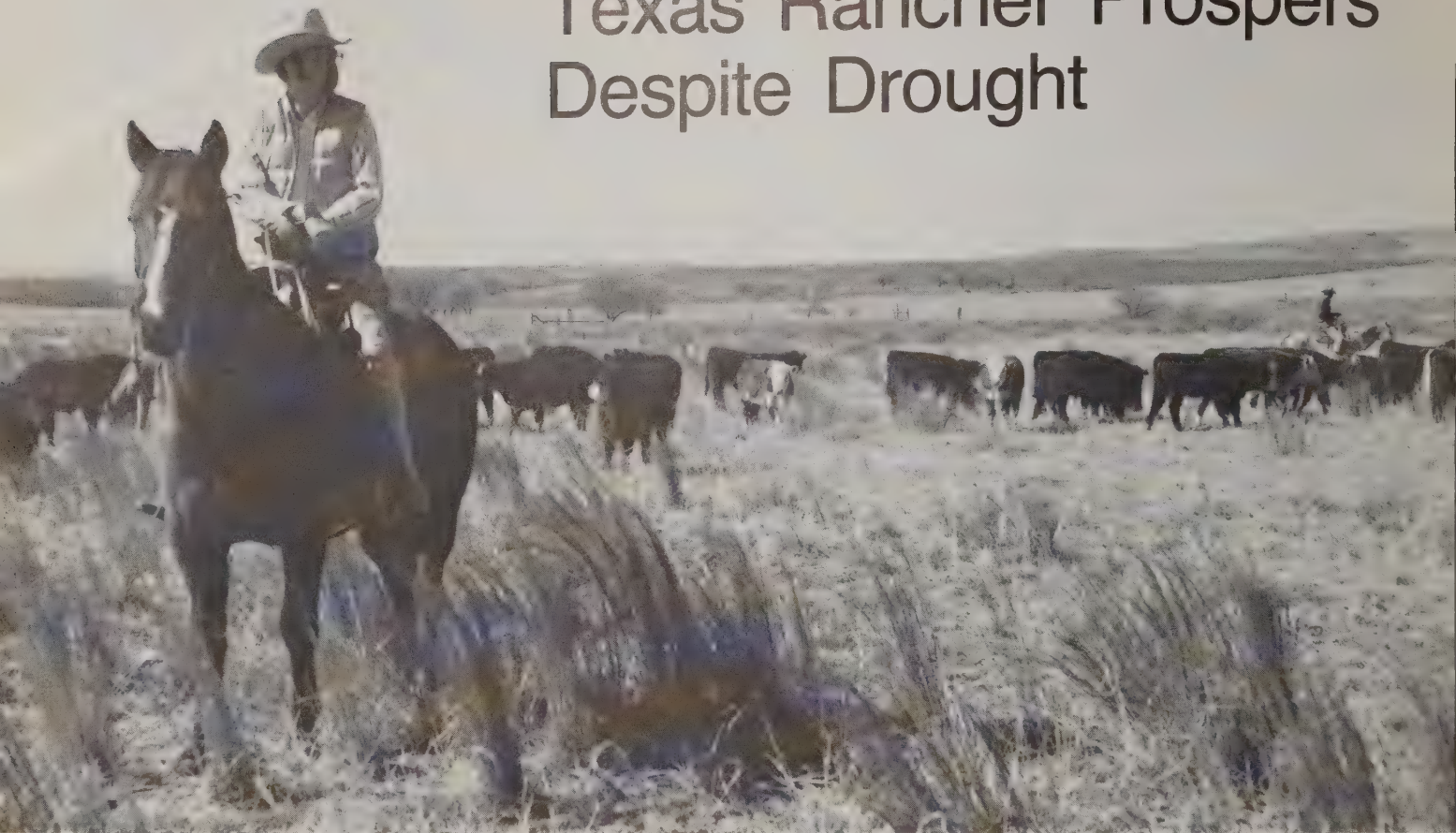
Nevertheless, sound conservation practices held the soil down on many farms and ranches. Minimum tillage left a protective cover of stubble on cropland. Windbreaks cut the destructive force of the wind around fields, feedlots, and homesteads. Stripcropping helped keep the land safe. Emergency steps, such as chisel plowing, provided temporary relief from wind erosion.

Though it was bad enough, last

year's drought fortunately was not a repeat of the 1950's or 1930's. But it did prove two points: It showed that the combination of soil and climate in the Great Plains continues to challenge conservationists. And it showed that well-planned conservation practices can bring Plains farmers and ranchers nearer to a permanent solution for their special problems. Skillful landowners can defend themselves with just a little help from the Great Plains Conservation Program.

Ms. Maus is editorial assistant, Midwest Technical Service Center, SCS, Lincoln, Nebr.

Texas Rancher Prospers Despite Drought



A Texas rancher's planned grazing system is spelling the difference between success and disaster during drought.

by Shirley Foster Fields

A fellow can get himself painted into a corner in this part of the world if he forgets that flexibility is the key to successful ranching.

Such is the conviction of west Texas rancher Don Powell, whose 750 steer calves near Canadian, Tex., are well watered and fed despite the drought that has besieged this Great Plains state.

Many Plains ranchers have received federally cost-shared shipments of emergency feed to keep their herds alive during this year's drought. Others have received government assistance to help defray the cost of transporting their cattle from drought-stricken regions to areas where grass is in good supply. But Powell has needed no such help. His forage is plentiful, and his cattle don't thirst.

The soils on Powell's 5,500-acre ranch are similar to those on other ranches in the area, and he has re-

ceived the same scant rainfall as others plagued by drought. Why, then, is he better off than the hundreds of Plains ranchers who have been forced to sell their livestock prematurely, taking heavy losses?

Powell attributes his good fortune to the ranch conservation plan he has followed since 1975 under the Great Plains Conservation Program (GPCP).

The focal point of his plan is grazing management. "I'm careful to reduce or increase the number of steers grazing in a particular pasture—depending on the condition of the forage there," he explains. "When I have the right number of calves grazing at the right time and place, and for the right length of time, my grass maintains its vigor and productivity, and I can forestall a crisis during drought."

The crisis, of course, is grass so damaged by overgrazing that a

rancher must take his cattle off it or risk killing it outright.

"When times are good, we average 22 inches of rain a year here," Powell says. "But in the 6 months from September to March, we had only 2½ inches. So you can see that in a region where fluctuations are so extreme, the fellow who makes a go of it can't leave things to chance."

Powell's grazing system on his 18 pastures is not fixed. In fact, pasture rotation may vary drastically from season to season or year to year. Critical factors are time and amount of rainfall, forage growth, brush spraying, and the sparseness or proliferation of brush.

In the spring of the year, the lusty brush plant shinoak (*Quercus harvardi*) thrives in west Texas' sandy soils. Its palatable green leaves attract livestock at a time when little else on the range is green. The attraction, however, can be deadly. The plant causes inflammation of the stomach and destruction of the kidneys, and there is no treatment for an animal that has eaten too much. At the first sign of budding, Powell shifts his cattle from the shinoak-infested pastures to pastures of sideoats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*), or weeping lovegrass (*Eragrostis curvula*). The next move is usually in July when he shifts the herds to forage sorghum on his croplands.

When rain does fall on Powell's ranch, it is grass, not brush, that benefits.

"Brush control was step number one in my conservation plan," he explains. "As recently as 2 years ago, brush had the upper hand on about half my land. But today I can look out and see native bluestems where sand sagebrush and shinoak used to grow."

Powell sprays the brush with herbicide in May, then lets the treated land rest until frost. Native grasses, such as sideoats grama, indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), and bluestems (*Andropogon* spp.) grow as the brush dies.

"These are the climax species, the natives here. They're making a tremendous comeback. By November,



Rancher Don Powell (left) and SCS District Conservationist Tom Powell discuss the rancher's conservation plan which includes a flexible grazing system and brush control.

they are well established, and I can return my herds to the renewed acres for grazing until spring."

Powell has seeded 260 acres of eroded cropland with weeping lovegrass, an introduced species. He will seed another 300 acres this year, and 200 more in 1978. The advantage of weeping lovegrass is that it is ready for grazing earlier than native grasses, allowing him to stop supplemental feeding earlier.

With help from the GPCP and the Salt Fork Soil and Water Conservation District, Powell has made other improvements: 2 miles of crossfencing, two new livestock water wells, and new drinking and water storage facilities that assure his herds an emergency water supply.

Powell signed his GPCP contract in September 1975, and has already completed half of his conservation plan. When the plan is finished—his target date is late 1978—he will

have converted 600 acres of wornout, eroded former cropland to permanent pasture; controlled brush on more than a thousand acres; and increased his herd from 750 to 1,000 head.

To date, the total investment in carrying out Powell's GPCP conservation plan has been \$16,216, the rancher explains. Half has been paid by GPCP and half by Powell himself.

"It will be another 2 years," he says, "before I achieve what I really want here. Even then by Texas standards, this will be a modest operation."

But, he concedes, when there's reserve water in the storage tanks, when the cattle are well fed, and the land is tied down by grass rather than blowing in the wind, there's something to be said for modesty.

Ms. Fields is a public information officer, Information Division, SCS, Washington, D.C.

Wave erosion on old-style berm is typical of that found in SCS survey when berm was not protected by special plantings.



by Arnold G. Davis

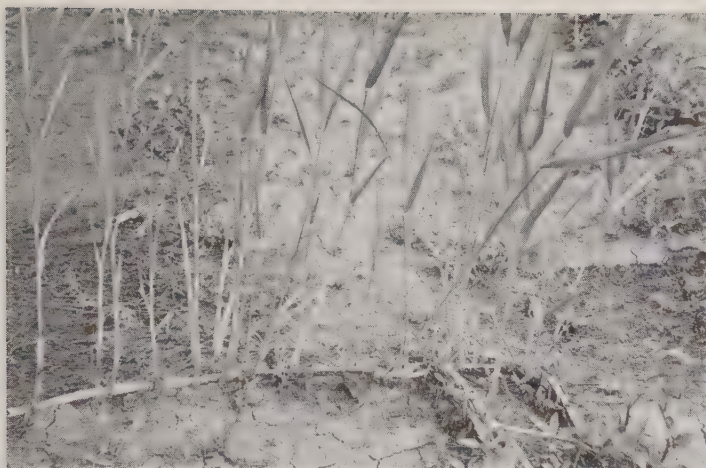
Roots and Reeds Stop Inland Lake Erosion

Two plants have proved effective in preventing shoreline erosion. They also tolerate high and low water levels.

Two hardy, improved drought- and water-resistant plant selections made by the Soil Conservation Service prevent erosion of earthen dams in the Great Plains by stopping waves at the water's edge. They are an adaptation of southern switchgrass (*Panicum virgatum* L.), from Georgewest, Tex., which was originally introduced for range-seeding improvement, and a superior form of common reedgrass (*Phragmites communis*).

During a survey 8 years ago, SCS discovered wave erosion on the front slopes of many earth-filled dams installed in the Great Plains to reduce flooding. Plant materials specialists and agronomists went to work to find plants that could stand high-water levels and drought conditions.

Included in the plants assembled for trials at the SCS plant materials centers in Knox City, Tex., and Manhattan, Kans., were species that produce massive, fibrous roots and those



At left, common reedgrass grows rapidly, with strong, lateral spreading of new plants.



Below, good stand of combination plantings on a critical berm site includes switchgrass, giant reedgrass, common reedgrass, and indigobush amorphia. Fences keep out grazing animals.

that produce rhizomes—lateral, underground stems—as well as a few shallow-rooted shrubs.

Two plant selections best met the tests: Common reedgrass, which produces numerous rhizomes that spread rapidly; and southern switchgrass, which produces massive, fibrous roots. Common reedgrass will tolerate drought and grow in about a foot of water and, like southern switchgrass, will withstand flooding.

SCS engineers cooperated in the study by modifying the berms or front slopes of the watershed structures, widening them and decreasing the degree of slope. Heavier equipment then could be used for tilling and planting, and there was more space to establish the vegetative cover.

Plantings of the improved selections on the redesigned berms have helped to prevent wave erosion and to protect the front slopes during flood-

ing in more than 100 watershed structures in the Great Plains.

The plantings also saved money. Had mechanical methods like rock riprap been used on the berms, the cost would have been much greater. Additional studies are needed to determine the long-term expense of maintaining the vegetative cover on the smaller, vulnerable watershed structures.

The two plant selections will soon be released for commercial production.

Mr. Davis is plant materials specialist, SCS, Fort Worth, Tex.



A tree planter is used to set common reedgrass plantings in furrow on newly smoothed berm at shoreline.

Ronald McDonnell opens a jackgate, timing irrigation to the minute. Concrete blocks embedded in newly installed turnout prevent erosion by breaking the force of falling water.



A Low-Salt Diet for the Colorado River

Efficient irrigation systems help farmers in southwestern Arizona conserve water—and reduce the amount of salt in the water that flows across the border into Mexico.

by Chris Williams
and Anne Zack

The Wellton-Mohawk area stretches 46 miles along the Gila River east of Yuma, Ariz. Most of the area is bottomlands of the Gila River. It is bordered by rocky desert mountains—the Mohawks on the east and the Gilas on the west.

Since the 1880's, farmers have made this hot, dry valley an oasis. At first they diverted the Gila River for irrigation. However, the surface water flow proved so erratic that in 1915 they began using ground water. Finally, due to poor water quality and insufficient quantity in the 1950's, farmers diverted Colorado River water to flood irrigate their crops.

Excess irrigation water had to be pumped from the ground to keep the water table from rising so high that it would stunt plant growth. Since the water leached salt from the soil as it seeped through the ground, it was more saline by the time return flows were discharged back into the river.

This water management problem in Wellton-Mohawk and other farming areas in the Colorado River Basin led Mexican officials to complain that Colorado River water reaching Mexico's Morelos Dam was so salty

that it was reducing crop yields and limiting the types of crops Mexican farmers could grow.

In 1973, the United States signed an agreement with Mexico to reduce, to a specified level, the salinity of Colorado River water crossing the border.

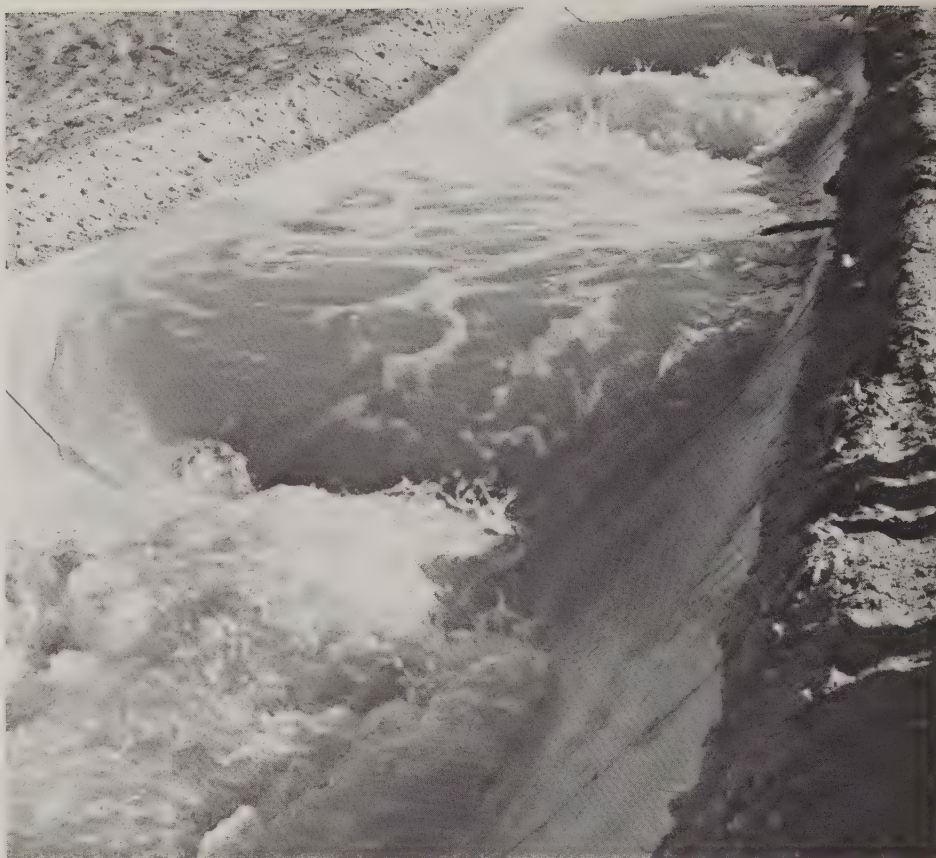
The Soil Conservation Service is helping meet the agreement by conducting an onfarm irrigation improvement project under the Colorado River Basin Salinity Control Program. The project is designed to reduce salty return flows by increasing irrigation efficiency on 23,800 acres of Wellton-Mohawk farmland. In addition to protecting water quality, increasing irrigation efficiency conserves water by cutting the amount wasted.

Through its special project office in Wellton, Ariz., SCS works directly with area farmers who sign contracts to develop and apply conservation plans that include cost-shared practices which will raise their irrigation efficiency.

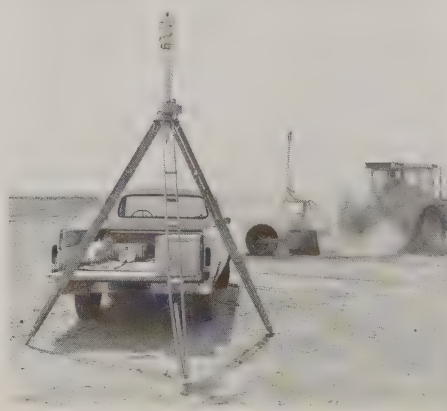
"We are trying to raise irrigation efficiency to 80 percent on the 23,800 acres in SCS's onfarm project," said Harold Pritchett, SCS project leader. "The goal for the overall salinity con-

At right, Ronald McDonnell installed homemade "baffles" in his ditches to slow water rushing down a grade so that it could be more easily controlled for efficient irrigation.

Below, flood irrigation suits the soils and crops in the Wellton-Mohawk area, as in this field of young alfalfa.



Above, working around the clock, laser-guided earthmovers level fields to provide uniform distribution of irrigation water. Multiple exposures catch laser light beamed from a sending unit on a tripod to a receiver on the tractor-pulled scraper. At right, Robert and James Diller use laser-guided equipment to smooth fields before spring planting.



trol program is to raise average irrigation efficiency from 56 percent to 72 percent for all 65,000 irrigated acres in the Wellton-Mohawk area."

Lining Ditches

Most of the farms in the Wellton-Mohawk valley are flood irrigated. Under SCS's onfarm project, irrigation ditches will be lined with concrete and enlarged to carry 15 cubic feet per second or more. Concrete ports or turnouts will be installed on ditches to deliver water to the fields.

A critical depth flume to measure flow will be installed near each farm's turnouts from the Wellton-Mohawk Irrigation and Drainage District's canal.

John Klingenberg, a farmer in the Wellton-Mohawk valley who manages 650 acres of bermudagrass seed and wheat, began improving his irrigation system 5 years ago. "What we've gained under the salinity control program is engineering," he said. "Before, we didn't know how to improve irrigation efficiency.

"All the ditches on this farm were dirt. They were poorly engineered, and



At left, a critical depth flume will be installed at each turnout from the canal. Flumes have gages which are used to measure water flow. Below, unlined ditches will be lined with concrete to prevent seepage, reduce sediment, and discourage gophers from burrowing in the banks.



we had problems with gophers. Well-designed, concrete-lined ditches have cut the time, labor, and water for irrigation in half. That's a real plus to me. We're also saving on equipment and fertilizer.

"Properly leveled fields are also important to efficient irrigation," Klingenberg explained. "Otherwise, much more water is needed to flood high areas in a field." In addition, salt accumulates on high spots and inhibits plant growth.

Leveling Fields

Leveling is a key practice in the on-farm irrigation improvement project. Equipment with laser beam control is used to finish the leveling job, enabling farmers to make their fields nearly dead level.

"The laser beam is the greatest thing that ever happened to land leveling," said Robert Diller, another Wellton-Mohawk farmer. "Everybody will be using it in a few years, once people see what it can do."

The laser beam sending unit sits on a stationary tripod and turns at 5 to 10 revolutions per second. A receiver

"Well-designed, concrete-lined ditches have cut the time, labor, and water for irrigation in half . . . and have saved on equipment and fertilizer."

on the hydraulic scraper locks into the beam and adjusts the blade level automatically.

"An instrument man and five stake pounders couldn't keep up with this laser beam," Diller said.

Using laser equipment, Diller and his brother, James, leveled their fields to within one-half inch of zero grade. They'll use their laser equipment each spring to smooth the fields before planting summer crops.

"I can grow wheat okay in winter," Diller said, "but dead level fields are much better for summer crops. If fields aren't dead level, water stands in low spots and cotton gets rank and alfalfa scalds out."

Improving Systems

Precise land leveling also is important to Ronald McDonnell, who manages 290 acres of alfalfa, small grain, and cotton.

Under the irrigation improvement program, McDonnell has streamlined his system on 64 acres on the narrow mesa along the southern boundary of the Wellton-Mohawk area. He has lined ditches and sized and leveled his fields. But his fields are not dead level. The 660-foot runs have 0.2 foot total fall so that water is "pushed" more rapidly to the low end of the borders.

"On the mesa, we think the slight fall works better than dead level because of the soil properties," McDonnell explained.

Mesa soils are sandy and well drained, and water penetrates quickly. If the fields were dead level, too much water would sink into the ground near the turnouts before enough reached the far end of the borders.

McDonnell used mechanical soil improvement along with leveling. He removed small areas of soil with poor water management properties and

filled the excavations with soils similar to those in the rest of the field.

When the crop is young, he can cover each 3-acre field with 1½ inches of water in only 15 minutes. He is equipping the system with an electric timeclock device and cylinders operated by air pressure that will open and close the turnout gates to irrigate the entire farm automatically.

"Some of the other farmers don't believe it," said McDonnell, "but this irrigation system is so efficient that if I turn the water off 1 or 2 minutes too soon or leave it on a minute or two too long, it makes a difference."

Saving Water by Drip Irrigation

SCS also is encouraging farmers to install drip irrigation systems in citrus orchards on the mesa where flood irrigation generally is less efficient than in the valley.

Project Leader Pritchett said that drip irrigation systems, which emit 1 to 4 gallons of water per hour at the base of each tree, are more efficient because the water is distributed directly to the plant roots and not over the open areas between the trees.

Robert Zeller, who farms 100 acres of orange, lemon, and grapefruit orchards on the mesa, was the first Wellton-Mohawk farmer to install a drip irrigation system.

Water from the Wellton-Mohawk Irrigation and Drainage District's canal is strained, filtered, and treated with sulphuric acid to remove algae and tiny organisms that would clog emitters. It flows through buried lines to spaghetti-type emitters—narrow plastic tubes—under each tree where it drips out slowly.

"Mature trees take 70 to 90 gallons a day in the summer," said Zeller. "That means the system will be running a maximum of 15 hours a day."

Although Zeller has had a few problems with clogged emitters, he cites many advantages of drip irrigation, including water savings.

"In 1975, we had a flood irrigation system for the orchards, and we used 13 acre-feet of water per acre. In 1976, we used only 6 acre-feet per acre, and the drip system was not completely installed. This year, I think

"In 1975 with a flood irrigation system we used 13 acre-feet of water per acre . . . this year with drip irrigation, we should use less than 4 acre-feet."

we'll use less than 4 acre-feet of water per acre," he said.

Meeting the Goal

Since the project office at Wellton was staffed in 1975, SCS has received 129 applications for assistance under the irrigation improvement program. Contracts have been signed for improvements on 46 farms covering 7,500 acres. Farms with the lowest efficiency are given priority.

By the end of June 1977, 132,314 feet of ditches had been lined with concrete; 2,969 acres had been leveled; three drip irrigation systems, including pumping plants for water control, had been installed; and 1,393 structures for water control measurement, such as critical depth flumes, had been built.

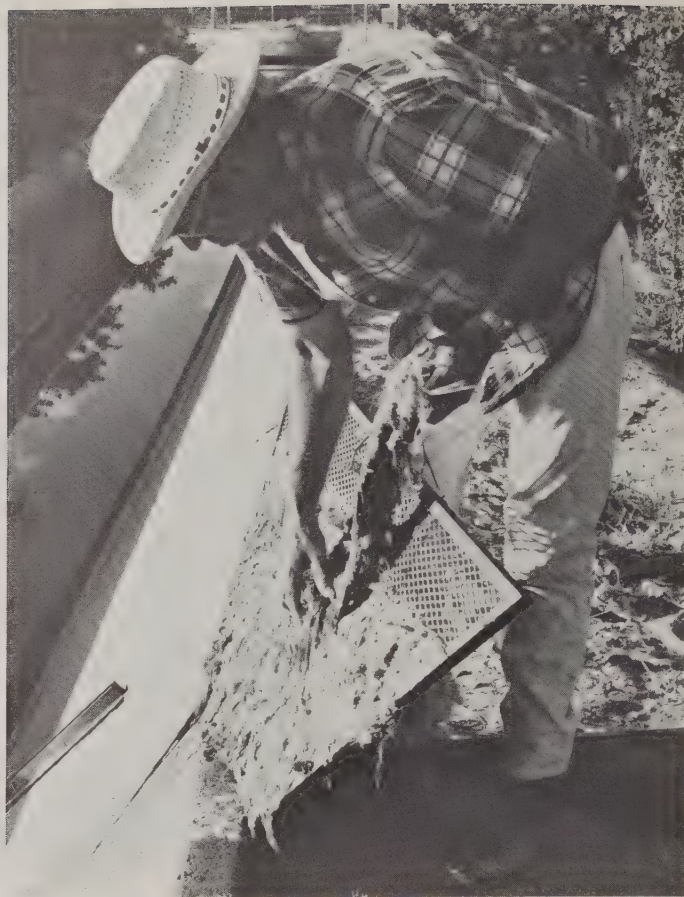
SCS is evaluating the project by comparing the amount of water used on each farm before improvements are

installed to the amount used after. Results as of June 30 indicate that on 865 acres of alfalfa, irrigation efficiency has increased to 85 percent; on 748 acres of cotton, to 97 percent; and on 1,004 acres of wheat, to 67 percent.

The Colorado River Basin Salinity Control Program's goal in the Wellton-Mohawk area is to reduce return flows by 35 to 40 percent a year by 1981, which, incidentally, will conserve 78,000 acre-feet of water a year. Accomplishing this goal will cut the Colorado River's annual salt load by half a million tons—a firm first step toward meeting the United States agreement with Mexico.

Mr. Williams is public information officer, SCS, Phoenix, Ariz.

Ms. Zack is a staff writer, Information Division, SCS, Washington, D.C.





Particle-free water is vital to drip irrigation. At far left, Robert Zeller scrapes off a strainer that cleans water from the irrigation district's main canal. The water will be filtered before it enters the drip system. Near left, a flow meter records the rate of flow and the cumulative amount of water entering Zeller's drip system.

Below, SCS Project Leader Harold Pritchett (left) and Ronald McDonnell discuss the farmer's improved irrigation system.



Wellton-Mohawk Project

The Soil Conservation Service's on-farm irrigation improvement project is part of a multiagency effort to reduce return flows from the Wellton-Mohawk area of Arizona. The Bureau of Reclamation, U.S. Department of the Interior, is leading the project under the Colorado River Basin Salinity Control Program, which was authorized in 1974 by Public Law 93-320 to meet the United States water quality treaty agreement with Mexico.

This law authorized the Bureau of Reclamation to build a desalinization plant near Yuma, Ariz., to treat return flows from the Wellton-Mohawk area. By reducing the return flows, the size and operating cost of the desalinization plant could be reduced.

Along with SCS's onfarm project:

- The Bureau is reducing total irrigable land in the Wellton-Mohawk area from 75,000 acres to 65,000 acres and is conducting an irrigation management service program. This includes, for example, using neutron probes to measure soil moisture.
- The Agricultural Research Service has set up a research station and demonstration plots near Tacna, Ariz., to study different irrigation systems, the timing of applications and amount of water needed for crops grown in the area, and the amount of water needed for leaching salt out of the root zone.
- The Cooperative Extension Service supports the salinity control program by conducting field demonstrations and distributing information.

In addition to Arizona, the 254,000-square-mile Colorado River Basin covers parts of California, Colorado, Nevada, New Mexico, Utah, and Wyoming. Farming areas in these states are also included in the salinity control program. SCS is studying six additional onfarm irrigation improvement projects in Colorado, Nevada, Utah, and Wyoming and is evaluating the need for 11 more studies in the Basin.

A conservation district in south-central Minnesota has a special blueprint for communicating with farmers.

Bringing People Face-to-Face with Conservation



Farmer Dick Hagen (right) speaks from experience about conservation. He chisel-plowed his cropland last year to prevent wind erosion and conserve moisture from winter snows. He and SCS technician Jody Bidinger examine the quantity of residue remaining on the surface.

"Conservation is an educational process," says District Supervisor Dick Hagen of the Renville County Soil and Water Conservation District (SWCD) in Minnesota. "The people who work the land are the only ones who can make conservation a reality."

According to Hagen, the way to make people want to practice conservation is to "bring people face-to-face with your product and get the neighbors talking about it." Communicate. Demonstrate. Make conservation something you can see.

Hagen follows this philosophy on his 80-acre farm. He follows it in his job as advertising manager for a large seed-corn company. He follows it, too, in his job as the Renville County SWCD public relations director.

Hagen has served on the district board for 2 years. He finds that farmers take three steps before they buy a new product or try a new practice: They read all they can about it; they talk to other farmers who have already tried it; and they go on field days to see it in action.

He said he feels that district people can best help farmers by keeping alert to new conservation developments and getting news of these developments to the people who can use them.

As an example, he cites the work of the Soil Conservation Service on agricultural waste management systems. "Before SCS was involved, farmers often bought systems that caused more problems than they solved. SCS people are helping by designing livestock management systems that are realistic and practical for the farmer."

The districts' responsibility, he says, is to help interested farmers act on their conservation needs. One way the Renville County SWCD does this is by publishing and distributing news articles and photographs about conservation practices.

They're succeeding. Until 2 years ago, farmers in the county constructed only two new wildlife ponds

a year. Since then, reports SCS soil conservation technician Jody Bidinger, farmers have put in 10 times that many ponds each year. "Three years ago," Bidinger says, "only a handful of farmers in the county had feedlot pollution control systems. Now we're helping with about a dozen new installations a year."

The district is focusing on its 3-year-old program for planting trees as windbreaks and using mulch tillage. Hagen is promoting these practices because they help conserve moisture.

"In the next few years," Hagen predicts, "we will see a tremendous increase in the number of field windbreaks planted as wind barriers." The district expects to help farmers plant about 40,000 trees this year, double the number planted before the program began.

Hagen is also spearheading a district project to lease some land and, in cooperation with local implement dealers, establish a permanent location for demonstrating conservation tillage.

Hagen's own farm is a demonstration in conservation. His farmstead is lined by a 500-foot, five-row windbreak, and he intends to plant more trees. All of the cropland is chisel plowed. He says this form of mulch tillage helps build up soil moisture while cutting his operating costs. The farm also has a newly dug wildlife pond.

Hagen feels that the conservation selling job will continue for some time. He warns that: "As long as there is land that needs conservation treatment, conservationists cannot afford to stop talking about our product—or to stop demonstrating its effectiveness."

Mr. Gahm is public information officer, SCS, St. Paul, Minn.



Ponds on the Palouse

by Claudia R. Aaker

When he first installed a pond on his farm in the Palouse country of northern Idaho, Walter Hellinger thought it was a good investment. He needed a livestock watering facility. He also wanted a spot where wildlife could find cover and where his family could enjoy fishing and picnicking.

That was 15 years ago. Today, Hellinger is retired from farming, but he still thinks his pond was a good investment. Wildlife continues to find refuge under the trees and shrubs, and the Hellinger family and friends fish for trout in the cool waters.

Hellinger was one of the first in his area to install a pond.

Now, conservation district officials and others in the water-hungry West are encouraging more farmers and ranchers to try farm ponds as emergency sources of water. Several of Hellinger's neighbors have followed his example. In Latah County, where the Hellinger farm is located, more than 600 ponds have already been installed, with 15 to 20 new ones being added every year.

Once he decided to install the pond, Hellinger received assistance from the Soil Conservation Service and the Latah Soil Conservation District (SCD) in planning and development. He located the pond in an area of his property where there were no trees and only an intermittent water supply.

Then, under a cooperative program with the Idaho Fish and Game De-

partment through the Latah SCD, he obtained trees and shrubs to create wildlife habitat. Plantings were single rows of ponderosa pine, mountain ash, Nanking cherry, and caragana.

Hellinger later added a grassed waterway to filter the inflow of water, thus assuring better water quality and longer pond life. He also stocked the pond with trout.

When it was completed, the pond had become a special kind of oasis, surrounded almost entirely by grain and pea fields.

Its trees and shrubs are in full production. Ponderosa pine dominates the shoreline, casting a mantle of shade along the water. Birds feed on the Nanking cherry bushes, which also produce enough fruit for home canning. Many kinds of wildlife, including songbirds, find shelter in the dense growth.

At a time when the West's water supply is the lowest in many years, ponds like the one on the Hellinger property are becoming more attractive—esthetically and economically. Other uses for pond water include irrigation, fire protection, and field and orchard spraying.

Ms. Aaker is clerk-typist, SCS, Moscow, Idaho.

Swimming and boating are just two of the many activities Scouts enjoy at Lake Brooks.



by Henry W. Robertson

Boy Scouts Are Cooperators, Too

The General Greene Scout Camp in Guilford County, N.C., has earned a reputation as a model campsite. Boy Scouts are working hard to keep that distinction by conserving the camp's natural resources.

Located on 500 acres of beautiful Piedmont woodland, General Greene Camp plays host to about 240 boys each week during the summer season. Another 3,000 campers enjoy the facilities in the fall, winter, and spring.

Most of the camp activities—swimming, fishing, and boating—center around Lake Brooks. This 30-acre manmade lake is part of a watershed covering more than 1,000 acres. Lake Brooks was constructed in 1928 by using mules and small dragpans. For more than 20 years, it was owned and used for summertime recreation by a successful attorney, A. L. Brooks, and his family. In 1951, Brooks and his wife donated 513 acres, including the lake, to the Boy Scouts.

Three-fourths of the original tract was in woodland and still is. In addition, the Scouts planted another 26 acres in pines. They also seeded 18 acres of permanent grass and planted 495 linear feet of grass field borders. Individual Scouts and troops continue to work on many conservation projects. They stabilize roadbanks, vegetate emergency spillways, install brush dams across eroding drainageways, and dig small diversion ditches to carry runoff water away from trails.

These projects serve two purposes: resource protection and con-

servation experience for the Scouts. Through them, the Scouts learn about rainfall, soil cover, floodwater retention, and sediment storage.

Lake Brooks is a good example of conservation in action. Within a short time after the Brooks family transferred the site to Scout management, the lake became threatened by both sedimentation and floodwaters. The Scouts turned for help to the Soil Conservation Service and the Guilford Soil and Water Conservation District.

They were given a soil map and a conservation plan that envisioned a miniature watershed project. The plan included small sediment and flood prevention dams on five tributary streams, along with land treatment and other measures. In 1968, when Guilford County joined with five other counties to organize the North Central Piedmont Resource Conservation and Development Area, the miniature watershed project became a reality. The last two dams were completed in 1973.

Since then, the camp has grown into a small community. It now offers a dining hall, medical facility, trading post, chapel, and amphitheater. The Scouts keep the camp running with good planning, hard work, and a sincere interest in resource conservation.

Mr. Robertson is district conservationist, SCS, Greensboro, N.C.

Conservation Heals Road Scars

by Gene Warren

Top, SCS District Conservationist Wayne Stephenson observes road-side erosion typical of many roads in Caddo Parrish, La. Bottom, Stephenson looks at completed erosion control work and is joined by Garland Colvin, RC&D Coordinator, and Doris McWilliams and H. K. Smith, Caddo Parish Police Jury members.



Many of the 62 roads in Caddo Parish, La., are environmental eyesores. Many—but not all.

Forty-nine of them still bear erosion scars. Soil has been washed into culverts, streams, and ditches. Flooding often follows a heavy rain. Roadway maintenance is time-consuming and costly.

But 13 of these roads are different. They've been shaped, seeded, mulched, and fertilized under a measure sponsored by the Caddo Parrish Police Jury with assistance from the Soil Conservation Service. On 65 miles of roadway, erosion scars have been replaced by smooth and shady slopes of thick, green grass.

It all began 3 years ago, when the jury learned of funds and technical aid available through the Twin Valley Resource Conservation and Development (RC&D) Area. "We have had road erosion problems as far back as I can remember," said Jury President Wesley Browning, Jr. "When the Caddo Parish RC&D Committee came to us with this proposal, we thought it was worth a try."

Under the cost-share arrangement, the jury furnishes labor and equipment, while materials are purchased with RC&D funds. SCS provides technical and planning assistance.

This is a pilot project, and no decision has been made on whether to expand it. Yet sponsors have little doubt about the value of what has already been done.

Tommy Stinson, chairman of the Upper West Red River Soil and Water Conservation District, agreed, "It sure helps pave the way for a better environment."

Mr. Warren is public information officer, SCS, Alexandria, La.

Conservation Districts and 208 Water Quality Management

The overall objective of the Federal Water Pollution Control Act Amendments of 1972 is to "restore and maintain the chemical, physical, and biological integrity of the nation's waters" by 1985. An interim goal is to make the water "fishable and swimmable" by 1983.

Section 208 of the Act is the basic tool for meeting these goals. Under it, each state must determine effluent limitations to meet water quality standards—at least to maintain the existing water quality—and to develop and carry out management programs to reduce pollution.

The National Association of Conservation Districts (NACD) has prepared "Conservation Districts and 208 Water Quality Management" to help conservation districts, state and areawide 208 planners, state water quality agencies, and state soil and water conservation agencies develop water quality management plans.

The comprehensive handbook discusses nonpoint sources of pollution, best management practices (BMP's), management agencies that will be responsible for carrying out water quality management plans, and regulatory programs. It emphasizes erosion and sediment control, animal waste management, and irrigation water management.

The handbook includes photographs, charts, tables, and appendixes

As illustrated in the handbook, a diversion keeps clean runoff away from feedlot, and a waste storage pond behind diversion traps feedlot runoff. Both are examples of conservation practices used to protect water quality.

CONSERVATION DISTRICTS AND 208 WATER QUALITY MANAGEMENT

- non-point source identification and assessment
- selection of best management practices
- management agencies
- regulatory programs



U.S. ENVIRONMENTAL PROTECTION AGENCY



NATIONAL ASSOCIATION OF CONSERVATION DISTRICTS

and examples of BMP's, pertinent regulations, agreements between conservation districts and cooperating agencies, and standards and specifications for conservation practices.

At the back of the publication is a step-by-step guide suggesting a task force approach for developing a non-point source pollution control program on the state and local level.

NACD prepared the handbook under a grant from the U.S. Environmental Protection Agency and was assisted by private organizations and government agencies including the Soil Conservation Service and other USDA agencies and the Bureau of Land Management.



Reviews

Black Walnut for Profit, A Guide to Risks and Rewards.

Bruce Thompson. 1976. Walnut Press, Scottsdale, Ariz. 285 pp., illus. \$10.70; \$8.70 paper.

This informative and useful reference book on the black walnut industry will interest anyone involved in growing walnut trees or selling the nuts and timber.

It discusses every phase of growing walnuts including methods of cultivation and protection against diseases and insects. Bruce Thompson describes the history and economics of the walnut industry and tells what he sees as the prospects of raising black walnut trees for timber.

He collected his information by consulting experts in the field, looking at research results, and drawing on his experiences in the walnut industry. Where pertinent, Thompson included brief research papers in the text.

Each chapter deals with one phase of growing walnuts. The chapters are arranged in order beginning with planting and proceeding to harvesting and selling the products. Numerous photographs, charts, and tables illustrate the text.

— Robert E. Hartung, forester, Northeast Technical Service Center, SCS, Broomall, Pa.

A Valley Renewed.

Hal Jenkins. 1976. The Kent State University Press, Kent, Ohio. 206 pp., illus. \$5.75.

"A Valley Renewed" is a detailed history of the Muskingum Watershed Conservancy District. It is an account of local, state, and federal agencies and organizations cooperating to build one of the first major flood protection projects in the United States.

Hal Jenkins, the Muskingum District's public information officer from 1935 to 1939, tells how the series of dams has saved lives and money by

Meetings:

July

- 1-4 Izaak Walton League of America, Atlanta, Ga.
 - 14 Forage Legume Conference, Ardmore, Okla.
 - 16-20 American Association of Nurserymen, Inc., Convention, Seattle, Wash.
 - 23-27 National Association of Counties, Detroit, Mich.
 - 24-28 National Federation of Business and Professional Women's Clubs, Inc., Louisville, Ky.
 - 25-28 The Fertilizer Institute Trade Fair and Fertilizer Conference, Kansas City, Mo.
 - 31-Aug. 3 American Agricultural Economics Association, San Diego, Calif.
-

August

- 7-10 Soil Conservation Society of America, Richmond, Va.
 - 15-18 National Farm and Power Equipment Dealers Association, St. Louis, Mo.
 - 17-19 Highway Geology Symposium, Rapid City, S. Dak.
 - 21-26 American Institute of Biological Sciences, East Lansing, Mich.
-

September

- 6-9 Hardwood Plywood Manufacturers Association, Seattle, Wash.
 - 13-16 Editorial Writers Conference, Calgary, Alta., Canada
 - 19-22 North American Forest Lands at Latitudes North of 60° Symposium, Fairbanks, Alaska
 - 25-29 American Society of Landscape Architects, Minneapolis, Minn.
 - 25-29 Farm and Industrial Equipment Institute Convention, Hot Springs, Va.
 - 25-29 International Grain and Forage Harvesting Conference, Ames, Iowa
 - 28 Clean Community System National Seminar, Keep America Beautiful, Inc., Washington, D.C.
-

controlling flooding in the Muskingum Valley, one of Ohio's largest watersheds, and by reducing flooding down the Ohio River. He also discusses how the project contributed to the development of our present-day flood protection program.

In this interesting narrative the author emphasizes that the Muskingum project also marked the beginning of planning watershed programs with

more than flood protection in mind. It is a major recreation area covering 52,000 acres including 10 permanent lakes. The dams were designed with the capacity to supply water for the increasing needs of a growing population.

—Ralph C. Wilson, recreation specialist, SCS, Washington, D.C.

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Irrigation Without Waste

From the Administrator

Drought has increased demand in many parts of the country this year for SCS technical help in designing and improving irrigation systems.

The Service recognizes its responsibility for giving irrigators the assistance they need to attain efficient and productive systems. We also recognize our responsibility to the public for keeping the waste of water to a minimum and for protecting water quality.

The amount of improvement that could be made in reducing waste in irrigation systems is enormous. Agriculture accounts for more than 80 percent of the Nation's water consumption today. If irrigation waste could be cut even 5 or 10 percent, it would represent a significant volume of water available for other uses.

There are many ways to reduce waste of irrigation water. Irrigate only as often as crops need it. There is a right rate and time to fit each crop and soil.

Keep ditches clean and line them to reduce seepage. Level fields. Install pumpback systems to reuse tailwater. Use shorter runs for furrow irrigation. Plan a system using efficient sprinkler or drip irrigation.

It is also possible to help protect water quality. In the Wellton-Mohawk area of Arizona, SCS is conducting an onfarm irrigation improvement project that is expected by 1981 to cut the Colorado River's annual salt load by half a million tons.

It's important for Service people and districts to keep in mind that when a farmer seeks irrigation assistance, he is concerned primarily with higher crop production. It is our job to remind him that water conservation is also a concern, and that any assistance provided him by the Service must be consistent with that concern.

A handwritten signature in cursive script that reads "Mel Davis". The signature is written in dark ink and is positioned at the bottom of the page, below the main body of text.

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Bob Bergland
Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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Cover:

The biggest single use of water in this country is irrigation and one of the biggest water conservation needs is improved water management techniques. See page 11. (Photo, Donald C. Schuhart.)

Soil Conservation

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PMC's: Where Are They?



The plant materials center at Bridger, Mont., has irrigated land with trees and shrubs planted on the contour (foreground), grasses and legumes, and honeybee colonies (right foreground) for pollination.

Plant materials centers are located in selected plant growth regions of the United States. Their purpose is to meet the need for better conservation plants along roadsides, streambanks, and shorelines; in rolling or hilly country; in surface mined areas; in "problem" soils and climates; and for many other purposes.

The answer to most soil erosion and improper water management continues to be vegetation, and the right kind of vegetation can solve many conservation problems.

Eighteen plant materials centers are operated by the Soil Conservation Service and two by cooperating agencies. They are located in:

Tucson, Arizona
Lockeford, California
Brooksville, Florida
Americus, Georgia
Molokai, Hawaii
Aberdeen, Idaho
Manhattan, Kansas
Quicksand, Kentucky
Beltsville, Maryland
East Lansing, Michigan
Coffeeville, Mississippi
Elsberry, Missouri
Bridger, Montana
Cape May Courthouse, New Jersey

Big Flats, New York
Corvallis, Oregon
Knox City, Texas
Pullman, Washington
Los Lunas, New Mexico (operated by New Mexico State University)
Bismarck, North Dakota (operated by North Dakota Association of Soil Conservation Districts)

In addition, SCS provides technical help to a State-operated center at Palmer, Alaska, and to an environmental plant center at Meeker, Colo., operated by the White River and Douglas Creek Soil Conservation Districts.

by Robert S. MacLauchlan

SCS researchers look for the “tough guys” of the botanical world—plants that grow with little water or under water, plants that thrive in acid minespoil or sodic soil or salt.

The Search for “Workhorse” Plants

The face of an earthen dam near Centralia, Kans., is stabilized with a useful import from the Orient—Chinese silvergrass. The dense stand grows well even in water.



WANTED: In the West, low growing, drought-tolerant plants that will grow on manmade soils, like highway banks.

In the East, plants that will thrive in surface minespoil high in sulphuric acid.

Around oil wells and in the irrigated West, productive plants to grow in soils high in salt.

In the South, plants to control gullies without becoming pests like kudzu.

A search for plants to perform these and many other "workhorse" jobs is going on at the 20 plant materials centers (PMC) of the Soil Conservation Service.

While most plant explorers look for improved food and fiber plants or more beautiful garden varieties, SCS researchers look for plants that will prevent soil erosion. They may or may not be attractive; they may or may not have commercial value to the farmer. But SCS insists that they help keep soil from washing or blowing away.

Each plant materials center receives, tests, and selects promising varieties from among thousands of candidates. A center does not sell plants and seed, but instead releases its selections to commercial nurseries and seed producers. In so doing, a center works closely with other Federal and State agencies, with commercial firms, and with seed associations.

More than 120 conservation plants released by SCS centers are in widespread use today, fighting a variety of erosion battles from shorelines to mountaintops. Typically, SCS releases five new selections a year. These are made available by growers to farmers and ranchers, highway landscapers, wildlife specialists, and many others who use the land.

A typical center search is highly systematic. The Cape May, N.J., PMC, for example, in the 1960's began testing every American beachgrass it could

find for its ability to stabilize sand dunes. A strain discovered on Cape Cod in 1965 proved superior, and after extensive testing in cooperation with Rutgers University, it was made available to commercial nurseries in 1972. Named 'Cape' American beachgrass, it is now widely available for use from Maine through North Carolina.

The Cape May PMC then began searching for plants to prevent beach erosion between the dunes and the sea, even in the area inundated twice daily by tides. Today the search has narrowed to several collections of saltmeadow and smooth cordgrass. One variety, it is hoped, will be found to grow well in the tidal strip; another, just above the normal high tide mark, where waves may lash the area during storms or high winds.

At present, Cape May scientists are testing more than 100 cordgrass strains collected from Maine to the Gulf Coast. They are growing in salt water basins at the New Jersey center.

In all, some 16,000 foreign and domestic plant collections are being evaluated at any one time at the Service's centers. There may be as many as 9,000 comparative test plantings going on, including such rigorous trials as putting rock salt around pine seedlings to simulate coastal conditions or increasing acidity drastically to resemble surface minespoil.

Varieties for testing may come from anywhere in the world. Many domestic

More than 120 conservation plants released by SCS centers are in widespread use today, fighting a variety of erosion battles from shorelines to mountaintops.

At left, a commercial grower near Jackson, Wyo., produces seed of 'Greenar' intermediate wheatgrass, an import from the U.S.S.R. selected at the PMC at Pullman, Wash. The plant is widely adapted for conservation use on well-drained soils in dryland and irrigated areas.

At right, first used for erosion control on Corn Belt highway banks, 'Emerald' crownvetch also stands up well under sustained grazing when used as a pasture legume. It grows well in shallow soils where grasses grow poorly.

plants are sent in by SCS field employees in response to "wanted" circulars from the centers. One of three wildflowers released last year for erosion control in the Great Plains—'Eureka' thickspike gayfeather—was spotted by Leo Brown, SCS technician at Eureka, Kans. He watched the small clump of plants off and on all summer, and, in the fall, mailed a tiny handful of seeds to the Manhattan, Kans., PMC. It was planted in rows with other seeds collected. Eventually, it was declared the superior strain and released to commercial growers.

Other selections have more exotic histories. 'Pink Lady' winterberry, a large shrub useful for the inside row of farmstead windbreaks and for wildlife food and cover, was taken in 1924 from a stone wall in the old section of Peking, China. The man who noticed it was USDA plant explorer P. H. Dorsett, remembered chiefly for bringing back thousands of soybean varieties from the Orient.

While many native grasses have been returned to the American rangeland, some of the more important wheatgrasses have come from overseas. For example, 'Luna' pubescent wheatgrass was collected by the Westover-Enlow expedition to the USSR and Turkey in 1934 and selected and increased in New Mexico. 'Latar' orchardgrass, one of the most successful imports, was introduced from the Institute of Plant



Some selections have exotic histories: 'Pink Lady' winterberry was taken in 1924 from a stone wall in the old section of Peking, China, by a USDA plant explorer.

Registered Hereford bulls dine on 'Luna' vetch in bloom. The SCS import from Turkey is popular in California today.

'Cardinal' autumn olive is a favorite of wildlife for its appetizing fruit.



Below, a crewman plants 'Arnot' bristly locust on coal minespoil in West Virginia. The spoil has a slope of 60 percent and is very unstable, but most of the locust should make the grade.



Above, dense stand of 'Streamco' purpleosier willow protects northern streambanks from ice and water erosion.



At left, another import from Turkey, 'Tegmar' dwarf intermediate wheatgrass, is used to seed diversions and waterways in the West. It forms an excellent sod, controls erosion, and requires little maintenance.



'Cardinal' autumn olive also grows well in surface minespoil. Other cover includes Kentucky 31 tall fescue and 'Viking' birdsfoot trefoil.

Industry in Leningrad and tested for many years in Washington State. 'Latar' proved the lowest among seven orchardgrasses in lignin and the highest in digestibility by livestock. Today it is available in quantity and used increasingly by western ranchers.

A few imports are "old Americans," but their value for conservation has gone unappreciated until recently. An example is purpleosier willow, brought by settlers from Europe in colonial days for making baskets. It got the name "basket willow."

Today it is a favorite of conservationists for its ability to prevent erosion of northeastern streambanks, particularly in the spring, when melting ice and snow increase streamflow and chunks of ice gouge out unprotected banks.

The value of purpleosier willow as a streambank buffer was observed along the Winooski River some 40 years ago by an SCS biologist in Vermont. Years of testing followed, proving that cuttings of one variety of the plant became established quickly. When planted with grass mixtures and legumes, it provided effective protection for streambanks within 2 years after planting. It suckered profusely from roots, forming a dense thicket. Ice floes can slide over the resilient plant stems without damaging them.

Today the remarkable plant is available from commercial nurseries under the name 'Streamco' purpleosier wil-

low. It should prove useful in New England States, New York, Pennsylvania, Michigan, and possibly other locations.

In several centers, a determined search has been going on for 30 years for plants with the ability to reclaim surface-mined lands. More than 2 million acres of such lands need reclamation, but the soils are often inhospitable to plant life. In the East, coal minespoils are frequently high in acid and low in fertility. Even so, several plants already have been selected and released by SCS that will survive in difficult minespoils and banks.

One of the most successful is 'Arnot' bristly locust, a native from the hills of Appalachia. Collected in 1958, it was released in 1969. It is a thicket-forming shrub, adaptable to all eastern coal mining areas, with the ability to cover even very acid spoils quickly. It spreads fastest, in fact, in barren areas where there is little or no competition from other vegetation. It is in wide use today.

Another good plant for reclamation is 'Cardinal' autumn olive, which will survive under a variety of minespoil conditions. It is outstanding for its early and vigorous growth and exceptional cover-producing qualities. And because of its nitrogen-fixing ability, it has a beneficial effect on species planted adjacent to it.

The fruit of 'Cardinal' autumn olive is also a favorite of wildlife.

One of the newest releases is

'Tioga' deertongue, a native warm-season bunchgrass that grows very well in acid minespoil and has excellent drought tolerance. It was selected at the Big Flats, N.Y., PMC.

In western surface mines, acidity is much less of a problem. Bigger problems are the low rainfall and soil fertility. The center at Bridger, Mont., has already released four plants with good growth qualities.

As surface mining has become increasingly important in the West, two districts in Colorado have opened a center at Meeker to develop "environmental plant materials" aimed at reducing erosion at mine sites and speeding reclamation. Center specialists will work closely with mine company reclamation experts.

Plant materials specialists, who include many scientific disciplines in their ranks, are convinced that somewhere in the world a plant exists to help solve practically every conservation problem.

Mr. MacLauchlan is chief plant materials specialist, SCS, Washington, D.C.

A determined search has been going on for 30 years for plants able to reclaim surface-mined lands. Today, several varieties are transforming minespoil areas.

Plants to Do a Job

The following are a few of the conservation plants released by SCS and its cooperators to commercial nurseries and seed growers. These conservation “winners” are selected from among thousands of contenders as the best for stopping soil erosion.

- ‘Zorro’ annual fescue—early maturing, self-reseeding annual used for roadside stabilization, critical area stabilization, and cover crops in low rainfall areas of California.

- ‘Corto’ Australian saltbush—a drought and alkali tolerant plant useful in critical area stabilization, including roadbanks, ditchbanks, and minespoils in the 10- to 12-inch rainfall areas of the Southwest.

- ‘Kalo’ dwarf English trefoil—useful for roadside and critical area stabilization (and beautification) in western Oregon and Washington.

- ‘Lathco’ flatpea—useful in critical area stabilization and beautification from West Virginia to Maine. Used on logging roads, gravel pits, utility rights-of-way, roadbanks, dams, borrow areas, and minespoils. Also a valuable wildlife food and cover plant.

- ‘Bobwhite’ wild soybean—self-reseeding; valuable in game bird food patch management in the southern Corn Belt.

- ‘Wytana’ fourwing saltbush—perennial shrub easily established from direct planting of the seed.

Valuable for mine land reclamation and range revegetation in Montana and Wyoming. Protein content remains high during winter, making it valuable for wildlife.

- ‘Midwest’ Manchurian crabapple—adapted from Montana to Michigan and as far south as Kansas and Missouri. It is an excellent plant for farmstead windbreaks, wildlife plantings, and beautification. Retains fruit all winter, making it an excellent winter food source for songbirds.

- ‘Marshfield’ big trefoil—valuable pasture legume for poorly drained soils for use west of the Cascade Mountains. It is also used for deer and elk feed and to stabilize logging roads.

- ‘Rem-red’ honeysuckle—multiple-use shrub adapted from Massachusetts to South Carolina and westward through Missouri. Fruit is very persistent and is available to birds during the winter.

- ‘Goshen’ prairie sandreed—a rhizomatous, warm-season perennial grass adapted to sandy sites receiving more than 12 inches of precipitation in eastern Montana, eastern Wyoming, western Nebraska and northeastern Colorado. Used for stabilization and range revegetation on sandy sites.

- ‘Emerald Sea’ shore juniper—a low-growing spreading shrub used for stabilizing and beautifying coastal sands subject to salt sprays.

- ‘Rosana’ western wheatgrass—native grass for range revegetation, critical area stabilization and mined land reclamation in Montana, Wyoming, and Colorado.

- ‘Halifax’ maidencane—selected specifically for protecting the shores of reservoirs from erosion by waves and for stabilizing the toe slopes of channels and small streams in Arkansas, Louisiana, and Mississippi.

- ‘Cave-In-Rock’ switchgrass—warm-season native perennial grass selected specifically to provide summer pasture in southern Corn Belt.

- ‘Critana’ thickspike wheatgrass—excellent for stabilizing disturbed areas, such as roadsides, airports, mined lands, and construction sites, in Montana and Wyoming. Produces a tight sod under dry land conditions.

- ‘Garrison’ creeping foxtail—widely used throughout the northern States as a productive pasture grass in permanently wet areas.

- ‘Kleingrass 75’—used extensively for soil protection and pasture and rangeland improvement in Texas.



Better systems and improved management techniques are available for conserving water for irrigation, the biggest single use of water in the United States.

For most crops, SCS recommends irrigating when the plants have used not more than half the moisture that is stored in the soil. If fields are allowed to dry out, plant quality and production may suffer.

Putting Water in Its Place

Watering crops sounds simple enough—until you try it.

Too much water and you can raise the water table, drown plants, erode the land, and deposit silt on fields.

Too little water and the whole effort is wasted.

Irrigation is by far the biggest single use of water in the United States—accounting for more than 100 billion gallons of water daily. Much of this water never reaches its destination. It seeps through unlined irrigation ditches, evaporates, or runs off the land. Although seepage and runoff water may flow back into rivers to be used downstream, its quality may have deteriorated because it has picked up salt and chemicals from the soil.

"One of the biggest needs in conserving irrigation water is improved management techniques," says Carl L.

Anderson, the Soil Conservation Service's water management engineer for irrigation. "This means determining how much water to apply, when, and how."

Because extra water is needed to leach salt accumulations out of the root zone, 100 percent efficiency in irrigation isn't practical or even desirable. But SCS estimates that 70 to 75 percent overall efficiency is a reasonable target for most systems. The national average is estimated to be only 41 percent.

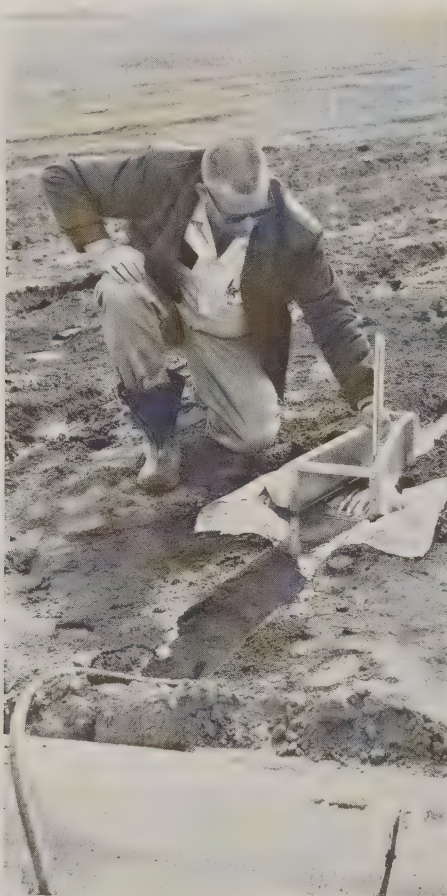
"The recent drought makes us all more conscious of the need to conserve water," Anderson said.

SCS provides onfarm technical assistance in developing irrigation systems and is stepping up assistance in operating and maintaining the systems.

Pasture and hay account for more than a third of the irrigated land in the West. After irrigation, livestock should be kept out of a pasture for several days to allow the soil to dry out and prevent compaction.



Surface irrigation systems often produce excess runoff water. This tailwater recovery system catches runoff and pumps it back over the crop. About 2,000 such systems are installed each year with technical assistance from SCS.



SCS uses soil surveys and onsite tests to help irrigators plan water management. In a furrow irrigated field, an SCS technician determines intake rate. Using a Parshall flume, he measures the flow near the supply ditch and again farther down the row. The difference in flow is the amount of water absorbed by the soil.

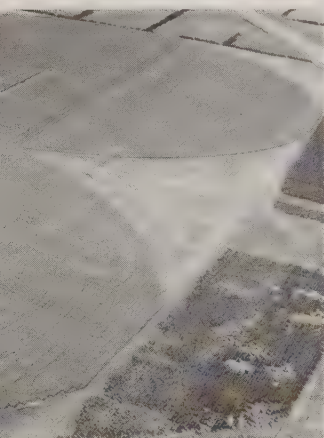
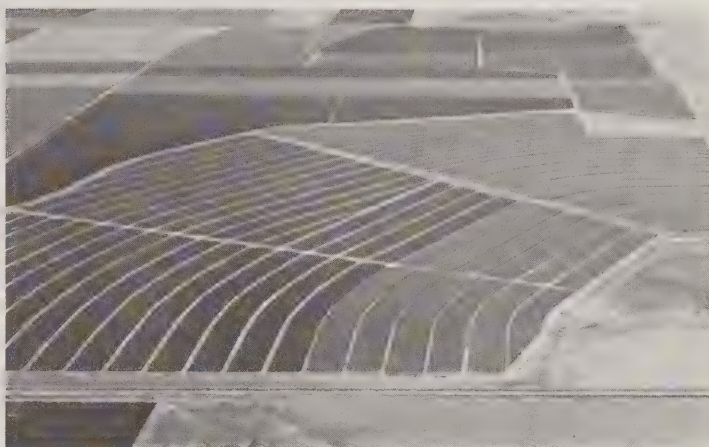


Center pivot systems, which normally irrigate 125 acres at a time with a single self-propelled unit, may require adjustments in other conservation measures. To make room for the pivot, for example, windbreaks may need to be relocated.

Before a farmer or rancher can irrigate simply according to his wristwatch, he must know the flow rate of his water supply, the water intake rate and holding capacity of his soil, the slope of his field, and the root depth and daily water consumption of his crop.



Slope can be altered for better water management. Parallel benches break up a long slope and are leveled for efficient water application. Underground pipes provide irrigation water to the benches.



Solidset sprinkler systems, such as this permanent overhead system in a Florida citrus grove, are designed according to the same soil and crop factors critical to flood and furrow irrigation. More than half of the irrigated land in the East is in fruits and vegetables.

California researchers use tensiometers (detail at far left) to determine moisture and salt movement in drip irrigation systems. How often to irrigate depends on how much water the soil can hold and how much moisture is already in the soil.



Royal lavender flowers of 'Eureka' thickspike gayfeather will be brightening roadsides in eastern Kansas and Nebraska within a few years.

Wildflowers: Beautiful but Tough

by John A. Dickerson
and Edith K. Hadle

Most Americans think of the Great Plains as a region of native grassland, and for a long time plant scientists shared that conception. Recently, however, they have been studying the contribution that native wildflowers can make in the Plains States to conservation, forage, and beauty.

One of the major investigations is taking place at the SCS plant materials center at Manhattan, Kans., in cooperation with the Nebraska Horticulture Department and the Nebraska and Kansas Agricultural Experiment Stations.

Objectives of the investigation are to:

- determine which wildflowers are useful and under what conditions;
- learn how to produce quantities of seed;
- find out how to harvest, clean, and store seed;
- establish seeding rates in mixtures with grasses;

Native forbs are making a comeback as the result of an interagency investigation to learn more about using wildflowers to solve a variety of conservation problems.

At the plant materials center in Manhattan, Kans., wildflowers and other promising conservation plants are assembled, compared, and evaluated. Proven plant materials are increased and released to growers.



Maximilian sunflower, shown before blooming, will be useful for range seedings and critical area and wildlife plantings.



- determine the value of wildflowers to livestock and wildlife; and

- establish procedures for releasing varieties and testing seed with crop improvement associations and the Association of Seed Certifying Agencies.

The quest for "good" wildflowers, or "forbs," as scientists call any herb which is not a grass or grasslike, has turned up several winners. Released early last year to growers were 'Kaneb' purple prairieclover, a native legume that fixes nitrogen into soils with depleted fertility; 'Eureka' thickspike gayfeather, a tall plant with lavender flowers that beautifies highway corridors; and 'Nekan' pitcher sage, that strengthens grazing lands and furnishes food for wildlife. (See "Prairie Wildflowers on the Horizon," September 1976 *Soil Conservation*.) All three will be available in quantity after the 1978 harvest.

Another forb, released in New Mexico, is 'Bandera' rocky mountain

penstemon, available now for erosion control in more arid regions. The attractive plant is suitable for roadside and other critical erosion plantings.

The wildflowers will not only spread a carpet of color across the Plains but will also keep soil in place, furnish livestock forage, and frequently provide food and cover for wildlife. Wildlife also is more abundant in grass stands containing wildflowers.

More wildflower species are undergoing comparative tests at the Kansas center. Those with potential for range forage include Maximilian sunflower, Engelmann daisy, and compassplant. Promising erosion control forbs include bush sunflower, sunflower heliopsis, grayhead prairie coneflower, and roundhead lespedeza. All will help build wildlife populations.

Problems of harvesting and cleaning seed already have been solved for most of these wildflowers. Most recently, butterfly milkweed, which produces light windborne seeds, was harvested successfully using a combine. Now studies are under way to learn

more about growing the flowers in solid, seed-producing stands.

Testing of seed mixtures of forbs and grasses is continuing at the center and the University of Nebraska, and work on a Kansas State University masters thesis funded by the Kansas Forestry, Fish, and Game Commission at the center has helped determine the value of forbs to nongame bird habitat.

Mr. Dickerson is manager, Manhattan Plant Materials Center, SCS, Manhattan, Kans. Ms. Hadle is a biological technician, SCS, Manhattan, Kans.

In northern Kentucky, a dairy farmer relies heavily on conservation measures to maintain high production on his small family farm.

by Harold A. Woodward

Small Acreage Pays Big Dividends

Charlie Snapp and his family have been recognized as "Master Conservationists."



Tell Charlie Snapp of Cynthiana, Ky., that the small farmer is on the way out, and he'll laugh at you. Dairymen with twice the land would admire Snapp's 16,000-pounds-plus production record, his efficient operations, and his "showplace" soil conservation program. Most people are surprised when they learn that Snapp is doing all this with 87 Holsteins on a 103-acre farm.

"We reached the point where we had to get in or get out," Snapp says. "If we were to continue to survive and make a living on a family farm, we had to play hard ball."

"Hard ball," according to Snapp, includes top-quality cows, soil conservation (including recycling wastes), a topflight feeding program (including "incentive feeding" of high-producing cows), and using all possible help from government agricultural agencies.

Most of Snapp's dairy herd has been raised on his farm. He has a small calf barn equipped with forced-air ventilation and provision for either liquid or dry feed, depending on the age of the animals. Snapp says that by raising calves from known high producers he has been able to build a top-quality herd.

He uses pelletized feed mixed with corn silage. The corn is raised on the farm and stored in three bunker silos holding a total of 631 tons.

Recently Snapp installed a magnetically operated feeder that allows a cow to receive a pound of feed each time she places her head in the feedbin. When a cow's daily production reaches 60 pounds, a magnet is placed around her neck to activate the feeder. The farmer says that after he began using this system, the rolling herd average increased 1,300 pounds during a 6-month period.

An intensive farm operation such as this places unusual demands on the land. Snapp has had to rely heavily on

conservation measures to maintain production. As a cooperator with the Harrison County Conservation District (CD), using the technical assistance of the Soil Conservation Service, he has constructed 1,300 feet of diversion channels and 12,000 feet of terraces that empty into 2 acres of grassed waterways.

A holding pond traps wastewater from the milk parlor and wastes that leach through the manure storage area. The wastes are recycled through an irrigation system onto 3.5 acres of tobacco and 45 acres of corn.

"My conservation program has been a godsend," Snapp says. "Without it, my farm would have been in the Mississippi Delta long ago."

Snapp uses the services of all the agricultural agencies in Harrison County to carry out his "rapid adjustment" program. Plans for his motel-type barn, plus money for expansion and for performing conservation practices, came as a result of close liaison with these agencies.

What do Snapp and his family get from all this hard work?

Recognition, perhaps, because they have been honored with a Master Conservationists Award by the Harrison County CD. A good living, maybe, because they do enjoy a comparatively high standard of living. But the benefits the Snapps receive are more than tangible things—the rewards of living, playing, and working together and keeping alive the principles of the family farm.

So, if you think the small landowner is on the way out, ask the Snapp family. They'll set you straight.

Mr. Woodward is visual information specialist, SCS, Lexington, Ky.

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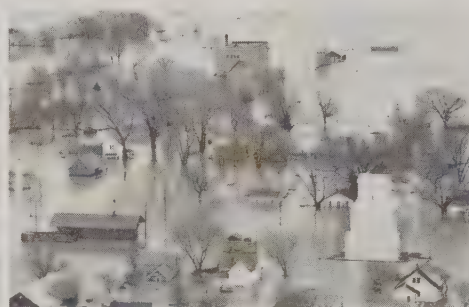
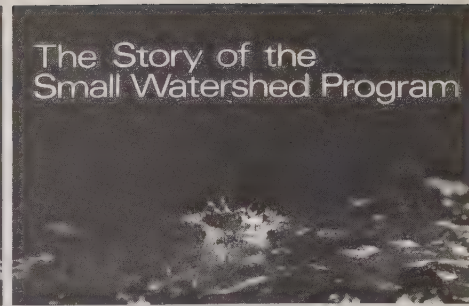
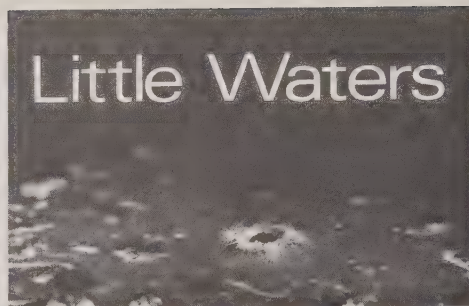
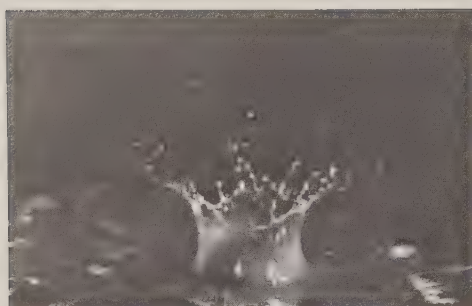


Snapp uses incentive feeding of high-producing cows. He places a magnet around the cow's neck which activates the feeder each time she places her head in the feedbin.

He uses pelletized feed mixed with corn silage. The silage is stored in three bunker silos and carried by end loader to portable feeding bins.



Snapp plants corn for silage on terraced land and irrigates with recycled waste.



Pioneering conservationists cautioned that the needs of small rivers not be overlooked. The results of their concerns are reflected in a new multimedia presentation.

Typical damage caused by upstream flooding is one of many three-screen, panoramic views used in "Little Waters."

"Little Waters," a new 21-minute, three-screen multimedia production, tells the story of the small watershed program from its inception.

The title for the production and the introduction to the show were drawn from the Little Waters report presented to President Franklin D. Roosevelt in 1936 by the Soil Conservation Service, Resettlement Administration, and Rural Electrification Administration.

In transmitting the report to Congress, Roosevelt said, "We have grown accustomed to dealing with great rivers with their large problems of navigation, of power, and of flood control. And we have been tempted to forget the little rivers from which they come."

He pointed out that we can have no effective national policy in flood prevention until we trace this running water back to its ultimate sources and find means of controlling and using it.

The Little Waters report laid out a strong case for upstream conservation measures such as terracing, contouring, and stripcropping that would control erosion and help stormwater move more slowly off the land.

Thus the seed for the small watershed program was sown.

The multimedia show graphically shows the problems of the thirties with upstream flooding and erosion. In fact, the year Roosevelt sent the Little Waters report to Congress, floods were among the worst on record in the north-east and Ohio and Mississippi Valleys; and Congress promptly passed the Omnibus Flood Control Act of 1936.

The three-screen presentation follows the upstream flood prevention work through the 11 authorized projects, the pilot watershed projects, and, finally, to Public Law 566 and the present time.

It points out that what makes PL 566 legislation unique is local involvement, and that local people are responsible for starting watershed projects, acting through their own organizations.

The show takes an in-depth look at nine projects located in seven States from Virginia to California and tells how they drastically curbed flood and erosion damage and, through multiple-purpose aspects, enhanced the local economy.

The nine are among the 1,185 projects completed or under construction. Besides flood prevention, each of the nine has one or more other pur-

poses, such as municipal and industrial water supply, irrigation, fish and wildlife development, or recreation.

The presentation acknowledges that critics of the program say it hasn't moved fast enough, that more communities need protection from damaging floods and erosion, and that more alternatives need to be explored.

But the accomplishments of the program far outweigh its shortcomings, and would astonish the authors of the Little Waters report.

The show was produced by the Soil Conservation Service's Information Division and utilizes six slide projectors, three dissolve units, and a digital programmer. Nearly 600 slides are shown in the presentation.

"Little Waters" was premiered at the National Watershed Congress in Washington, D.C., in June. It is scheduled for several showings at USDA's Jefferson Auditorium in Washington, D.C., and at the National Association of Conservation Districts Convention at Anaheim, Calif.

The handicapped find recreation facilities that meet their needs at this Pennsylvania park—built after careful planning, next to a Public Law 566 flood protection lake.

by Frederick E. Bubb
and Lowell W. Edminster

Everybody's Lake

Mauch Chunk (pronounced Maw-Chunk) Lake, with the 2,100-acre county park that surrounds it in eastern Pennsylvania, is truly everybody's recreation area. It was planned that way.

The 345-acre lake, the only impoundment in the Public Law 566 project in the Mauch Chunk Creek watershed, helps protect the town of Jim Thorpe from floods in the valley below. Since the dam was finished in the early 1970's, it already has saved the town from probable flooding during Hurricane Agnes and an even heavier rainfall in a 1973 storm.

Prior to construction, Carbon County purchased the land around the lake for a county park.

"From the start, we wanted the park to be accessible to all county residents and visitors," recalls Darlene Confer, director of the county recreation authority. "Regulations now require that federally assisted recreation areas be usable by the handicapped, but we

were going to follow that course whether required or not. Perhaps we were more aware of the need than other people because of the handicapped people who work in county offices."

The Soil Conservation Service reviewed plans and designs for adequacy.

Features for the physically handicapped include gently sloping ramps leading to the water's edge; guardrails leading into the water to provide safe support for waders and swimmers; picnic tables with concrete aprons; special restroom facilities; and nearby parking.

While no count has been made of the handicapped using the park, many visit it each week. The Good Shepherd Home of Allentown, Pa., a physical rehabilitation center, provides regular visits for its patients.

There also is a special site, Camp Appletree, for the mentally handicapped, with 80 percent of the cost funded by the local chapter of the Pennsylvania Association of Retarded Children. Other organizations, like the American Legion, also contribute. The camp provides a day camp for 4 weeks in July for 35 children and young people.

Other groups served by the park are senior citizens, whose own organizations will develop a reserved park site, and young people's groups, like 4-H and Scouts, who also will have a hand in setting up and maintaining their own area.

Mr. Bubb is public information officer, SCS, Harrisburg, Pa.
Mr. Edminster is district conservationist, SCS, Jim Thorpe, Pa.



Mauch Chunk Lake in Pennsylvania offers facilities for the handicapped such as guardrails and gently sloping ramps which lead into the water.

News Briefs

Widespread Drought

Drought conditions earlier thought to be restricted to the West and Midwest also plagued States in the East and Southeast as the year progressed.

A supplemental drought appropriation bill signed by the President on May 4 made new loan and grant funds available to farmers, ranchers, and others in emergency drought impact areas in all of 12 States and in certain counties of 12 other States. The U.S. Department of Agriculture (USDA) administers the bulk of the \$469 million program.

But by the week of July 4, counties in five other States—Alabama, Georgia, Florida, Indiana, and West Virginia—and one parish in Louisiana were designated eligible for the emergency program. Meanwhile, emergency conservation measure funds were being used in the Caribbean Area—Puerto Rico and the Virgin Islands—to cope with the drought.

Originally designated to apply for loans and grants were individuals and communities in all of California, Minnesota, Missouri, Montana, Nebraska, Nevada, North Dakota, Oklahoma, South Dakota, Utah, Wisconsin, and Wyoming; and in designated counties in Arizona, Arkansas, Colorado, Idaho, Illinois, Iowa, Kansas, Michigan, New Mexico, Oregon, Texas, and Washington.

By mid-July, 1,699 counties in 30 States had been designated eligible to receive funds for measures to cope with what some believe is the driest year of the century. The prospect, moreover, is for still other States to be added to the growing list of drought-plagued areas.

The Soil Conservation Service, under the \$100 million Drought-Flood Conservation Program administered

by the Agricultural Stabilization and Conservation Service, is providing technical assistance to emergency drought areas.

Before the passage of the drought bill, SCS had already accelerated its assistance, through local conservation districts, to farmers, ranchers, and local governments in drought-stricken areas.

Drought emergency funds included \$150 million in 5-percent loans and \$75 million in grants available through USDA's Farmers Home Administration to local governments for restoring or protecting community water supplies. Funds totaling \$144 million were made available through the U.S. Department of the Interior.

All emergency drought funds must be committed by September 30, 1977, and all funded projects must be completed by November 30, 1977.

Land Judging Contest

It is one of the greatest outdoor classrooms of all. No wonder it is called the "World Series" of land judging.

The 26th annual International Land, Pasture, and Range Judging Contest, held this past May in Oklahoma City, Okla., drew 700 contestants from 32 States, from Vermont to Hawaii.

For the first time in recent years, there was no rain during the school and contest, traditionally set up and judged by the Soil Conservation Service staff in Oklahoma. A new feature, the homesite evaluation category, was first used last year and was also included in this year's competition.

Stations KTVY and WKY (radio) of Oklahoma City sponsored the contest.

Teams made up of four contestants each applied their knowledge and skills as they examined slope, soil, and

plants. International 4-H and Future Farmers of America (FFA) team champions each received a trophy, medals, and \$100; reserve champions, each a trophy, medals, and \$75; and individuals, each a trophy, medals, and \$50 or \$25.

The winners were: 4-H team, Richmond, Ky.; FFA team, North Loup, Nebr.; 4-H individual, Steve Whittaker, Tyner, Ky.; FFA individual, Dennis Wells, Hoyt, Kans.

Winners in the pasture and range category were: 4-H team, Binger, Okla.; FFA team, Muskogee, Okla.; 4-H individual, Kelly Battles, Hobart, Okla.; FFA individual, Lonnie Daugherty, Muskogee, Okla.; and adult, Kendall Brashears, Ninnakah, Okla.

Walking off with the prizes in home-site evaluation were: 4-H team, Shelbyville, Ind.; FFA team, Comeaux High, La.; 4-H individual, Alan Lloyd, Charles Town, W. Va.; FFA individual, Mike Polley, Prairie View, Kans.; and adult, Larry Watson, Mannington, W. Va.

Conservation in El Salvador

Several conservation practices are being introduced on a "trial" farm in Santa Cruz Analquito in tropical El Salvador.

The Ministry of Agriculture organized the project to conserve resources and increase food production. The United Nations Development Program and Food and Agriculture Organization provided technical assistance.

Bank terracing, terraces for fruit and vegetable plantings, convertible miniterraces, and hillside canals are among the practices installed. All are well suited to the country's terrain of mountains and upland plains where coffee has been the major crop.

An agricultural research team from Taiwan gave onsite assistance to this smallest (8,260 sq. mi.) and most densely populated (over 4 million) of the six Central American countries.

The project marks the beginning of a national conservation program for El Salvador.

Farming Costs Up

It cost the Nation's farmers 9 percent more in 1976 than in 1975 to produce agricultural commodities, according to the USDA's Statistical Reporting Service (SRS).

Feed purchases claimed the largest share of production expenditures: \$14.1 billion or 15.8 percent of the total, compared with 15 percent in 1975. Rents also were up; so were wage and contract labor expenditures, from \$6.3 billion or 7.7 percent of the total in 1975 to \$7.4 billion or 8.3 percent in 1976.

Fertilizer, lime, and soil conditioners took fourth place in expenditures, costing \$7.2 billion, up from the \$6.8 billion recorded in 1975, even though the percentage of total expenditures moved down from 8.3 to 8.1 from 1975 to 1976.

Fuel costs advanced in 1976, accounting for \$5.2 billion or more than 5.9 percent, compared with 5.5 percent of the total expenditures in 1975.

These data are included in the annual summary, "Farm Production Expenditures for 1976," in which SRS summarizes 16 categories of farm production expenditures. For 1976, seven of these took larger portions of the total dollar outlay than the year before; eight showed declines; and one was unchanged.

Financial Squeeze on Western Farmers

The financial condition of many farmers in nine States west of the Mississippi has been deteriorating, reports the USDA's Economic Research Service (ERS).

Reports of farmers having financial problems caused by drought and low wheat and cattle prices brought concern over conditions in the area.

ERS conducted a special survey among 400 bankers selected randomly in Colorado, Kansas, Minnesota, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas.

These States combined have one-quarter or 685,000 of the Nation's farms, and these account for about 27 percent of the U.S. total farm receipts.

Income and credit appear to be

major problems for one-third or 73,000 of the farmers in the area borrowing from banks. Farmers in Nebraska, Kansas, and Oklahoma—where the major industries are livestock and wheat—were the hardest hit financially.

The bankers expect more than one-fourth or about 59,000 farmers in the nine-State area to be forced to refinance their loans or dispose of some farm assets to meet their debt payments. Another 14,000 farmers, or 6 percent, will not be able to repay their debts with expected income, according to the survey.

Total dollar volume of bank loans in the area rose 17 percent from March 31, 1976, to March 31, 1977, and agricultural loans not secured by real estate rose by 19 percent. But total deposits increased only 11 percent in the same period.

The farmers' serious financial problems, if prolonged, could have an equally severe impact on rural communities in the area. Reduced income to merchants could mean reduced employment. Land values and taxes could fall and communities could be forced to cut services.

National Wetlands Inventory

The Soil Conservation Service is assisting the U.S. Department of the Interior's Fish and Wildlife Service to conduct the first comprehensive inventory of the Nation's wetlands since 1954.

William B. "Blake" Parker, assistant State soil scientist for Mississippi, is representing USDA on the National Wetlands Inventory staff at St. Petersburg, Fla.

SCS soil scientists also are helping to develop a new classification system for the survey, which will include all 50 States and the territories.

The new system is being designed to provide data to wildlife managers, hydrologists, landscape planners, economists, engineers, and public and private agencies and organizations involved in managing wetlands. SCS will determine relationships between kinds of soils and types of wetlands and wetland vegetation.

Urban-to-Rural Migration

Rural areas and small towns in the Nation grew by 3.6 million people, a 6.6-percent increase in the 5-year period 1970-75.

The trend toward increasing urban-to-rural migration was first noted in the 1970-72 period by the USDA's Economic Research Service (ERS), which analyzes county population estimates compiled by the Census Bureau.

Reversing the massive rural-to-urban migration that began with World War II and continued through the 1960's, the urban-to-rural migration, which is also occurring in other developed nations, is likely to continue in the United States at least into the 1980's.

ERS Demographer Calvin Beale, who prepared the latest 5-year-population analysis, reported that the move to rural areas is not a back-to-the-farm movement. The farm population declined by about 850,000 or 8.7 percent in the 5-year period, although significant additional losses in farm employment have ended.

About half the migration to nonmetropolitan counties from 1970-74 was to counties that had retirement areas. It was the fastest growing group of nonmetropolitan counties in that period. They had a net gain of 932,000 people or a 14.5-percent increase, triple the national average.

Beale says economics and attitudes are causing people to move to nonmetropolitan areas, where employment has increased faster than in metropolitan areas in every major industry except government. A narrowing gap between the quality of life in urban and rural areas is another reason people are moving to rural areas, along with the association of large cities with crime, pollution, and high prices.

Beale notes that gasoline costs and supplies could change the current trend. "Rural people use considerably more gasoline per capita and have fewer public transportation alternatives during an emergency," he points out.

Severe Wind Erosion Hits Plains

Not since the mid-1950's have wind and dry weather joined forces to damage as much land—nearly 8 million acres.

Nearly 8 million acres in the Great Plains were damaged by wind during the 1976-1977 erosion season—the most extensive damage since the drought of the 1950's.

Soil Conservation Service field reports from 346 counties showed 7,992,802 acres damaged from November through May, up from the 6,165,335 acres damaged during the same period a year ago.

Colorado was hardest hit: wind severely eroded 2,520,300 acres compared to 739,750 acres damaged at this time last year.

Other States reporting more erosion than last year were Texas, 2,192,173 acres damaged compared to 1,572,079 acres the previous year; North Dakota, 791,805 acres compared to 296,700; New Mexico, 597,550 acres compared

to 288,275; South Dakota, 692,621 acres compared to 463,549; and Nebraska, 396,260 acres compared to 348,343.

States reporting less erosion than a year ago are Montana, with 266,623 acres damaged compared to 903,454 acres the previous year; Kansas, 315,450 acres compared to 907,288; Oklahoma, with 206,840 acres compared to 619,867; and Wyoming, with 13,180 acres compared to 26,030.

About 80 percent of the damage in the 10-State area was to cropland. SCS considers land as damaged if enough soil has been removed or deposited to subject the land to further erosion hazard or to impair its capacity to produce.

Emergency tillage to prevent land

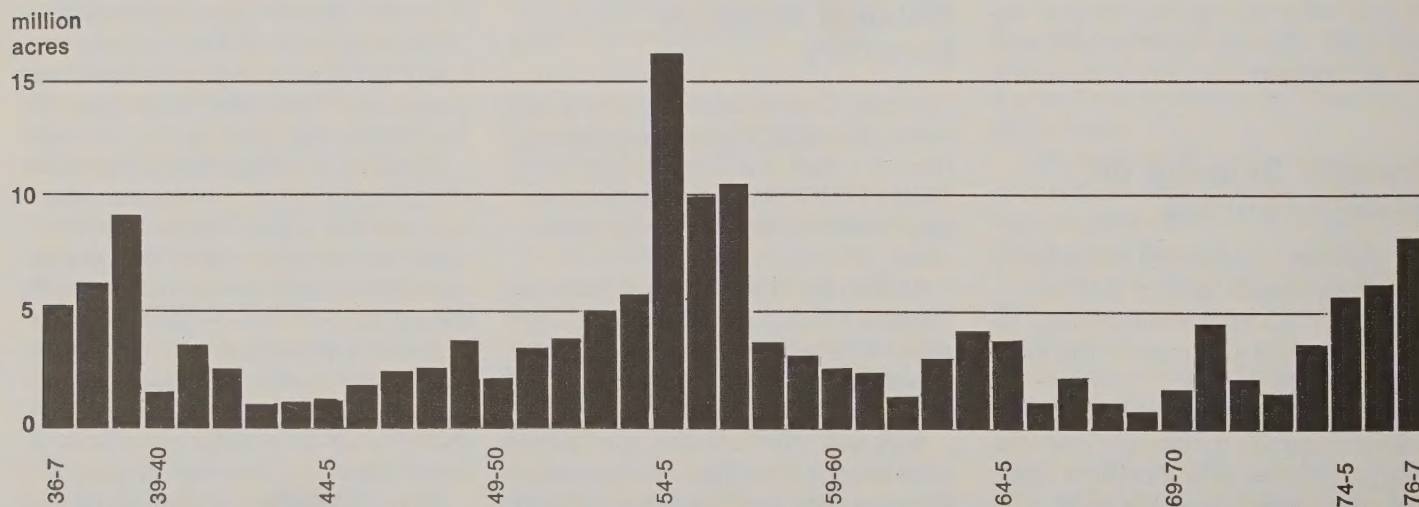
damage was reported in every Plains State, with more than 3.5 million acres treated.

Contributing to the increased wind erosion this year were frequent, long windstorms, inadequate crop residue cover, excessive tillage, and inadequate soil moisture. Erosion damage in the Plains is greatest from November through May, when high winds are most frequent. There also is less protective cover on the soil and usually less precipitation.

SCS has kept statistics on Great Plains wind erosion damage since 1935, except for a 10-year period beginning in 1943 when figures were compiled by the Great Plains Agricultural Council.

Acres of Land Damaged Annually in Great Plains

Seasons 1936-37 to 1976-77



Beaver Dams Help Peanut Farmers

by F. Dwain Phillips
and John I. Upton

Beaver dams are a vital component of an irrigation system developed by a half-dozen farmers in Hughes County, Okla. The system supplies water to more than 400 acres of peanuts, which could not be grown there without irrigation.

Joe and Kelly Pace, Earl and Jim Shaw, Grant Osborn, and Paul Dean are cooperators with the Hughes County Conservation District. They work together closely, sharing equipment, labor, and irrigation water from a lake built in the Big Wewoka Creek watershed under the Soil Conservation Service's small watershed program.

The farmers release water from the lake by opening a small gate in the principal spillway in front of the dam. The water travels through a pipe beneath the dam into the creek below. It is picked up downstream by irrigation pumps and spread on the crops by sprinklers.

The farmers needed small pools in the creek in which to put inlet pipes for their irrigation pumps. That's where the beavers helped out.

The men first tried to construct dams across the creek using old railroad crossties and boards; but each time it rained, the dams washed out.

Beavers also had built a series of 4-foot-high dams across the same creek. Their dams, however, can withstand the rushing water with very little damage—and if they are damaged, beavers quickly repair them. The small pools formed by the beaver dams proved ideal for the farmers' inlet pipes.

Mr. Phillips is public information officer, SCS, Stillwater, Okla.
Mr. Upton is district conservationist, SCS, Holdenville, Okla.

Meetings:

August

- 7-10 Soil Conservation Society of America, Richmond, Va.
- 15-18 National Farm and Power Equipment Dealers Association, St. Louis, Mo.
- 17-19 Highway Geology Symposium, Rapid City, S. Dak.
- 21-26 American Institute of Biological Sciences, East Lansing, Mich.

September

- 6-9 Hardwood Plywood Manufacturers Association, Seattle, Wash.
- 13-16 Editorial Writers Conference, Calgary, Alta., Canada
- 19-22 North American Forest Lands at Latitudes North of 60° Symposium, Fairbanks, Alaska
- 25-28 American Society of Landscape Architects, Minneapolis, Minn.
- 24-27 Farm and Industrial Equipment Institute Convention, Hot Springs, Va.
- 25-29 International Grain and Forage Harvesting Conference, Ames, Iowa
- 28 Clean Community System National Seminar, Keep America Beautiful, Inc., Washington, D.C.

October

- 2-6 Congress for Recreation and Parks, Las Vegas, Nev.
- 2-7 Water Pollution Control Federation Conference, Philadelphia, Pa.
- 8-12 American Institute of Planners Conference, Kansas City, Mo.
- 14-20 National Environmental Sanitation and Maintenance Educational Conference, Exposition, Lake Buena Vista, Fla.
- 15-19 American Bankers Association, Houston, Tex.
- 16-19 American Forestry Association, Monterey, Calif.
- 20-23 National Association of Biology Teachers, Inc., Anaheim, Calif.
- 27-28 American Association for Vocational Instructional Material, Fargo, N. Dak.
- 31-Nov. 2 American Association of State Highway and Transportation Officials, Atlantic City, N.J.



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